PMI

VOL. 1 NO. 3
MARCH
1958
PRICE 50¢

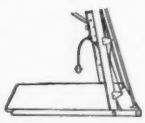
PHOTO METHODS FOR INDUSTRY

DARKROOM ISSUE

HERE'S WHY **BESELER** IS THE ENLARGER FOR PHOTOGRAPHERS OF TODAY . . . TOMORROW . . . AND YEARS TO COME.

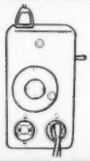
Absolute Rigidity of framework with structurally engineered . . . vibration-free . . . triangular truss construction.

A large unobstructed baseboard without rear working area impediments . . . so annoying in ordinary enlarger designs.

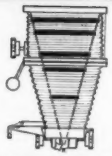


Controlled Tension Negative Stage—that locks simply . . . swiftly . . . into a light-tight unit for any position with positive accuracy. Opens without moving lamphouse. No danger of cracked condensers!

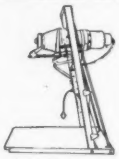
Electric Positioning Controls for speedy, smooth up-down movement . . . automatically. Perfect balance . . . full security for the lamphouse.



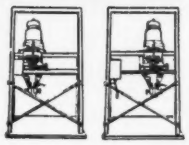
Optically Precise enlargements from 8mm (Minox) to 4" x 5" negatives without changing, storing or handling costly condensers. Twin condenser system provides maximum illumination in conformance with optical laws proven during almost 100 years in the field.



Horizontal Projection at precisely 90° for giant mural enlargements (floor projection too, if desired!) instant and simple return to 0° for vertical projection.



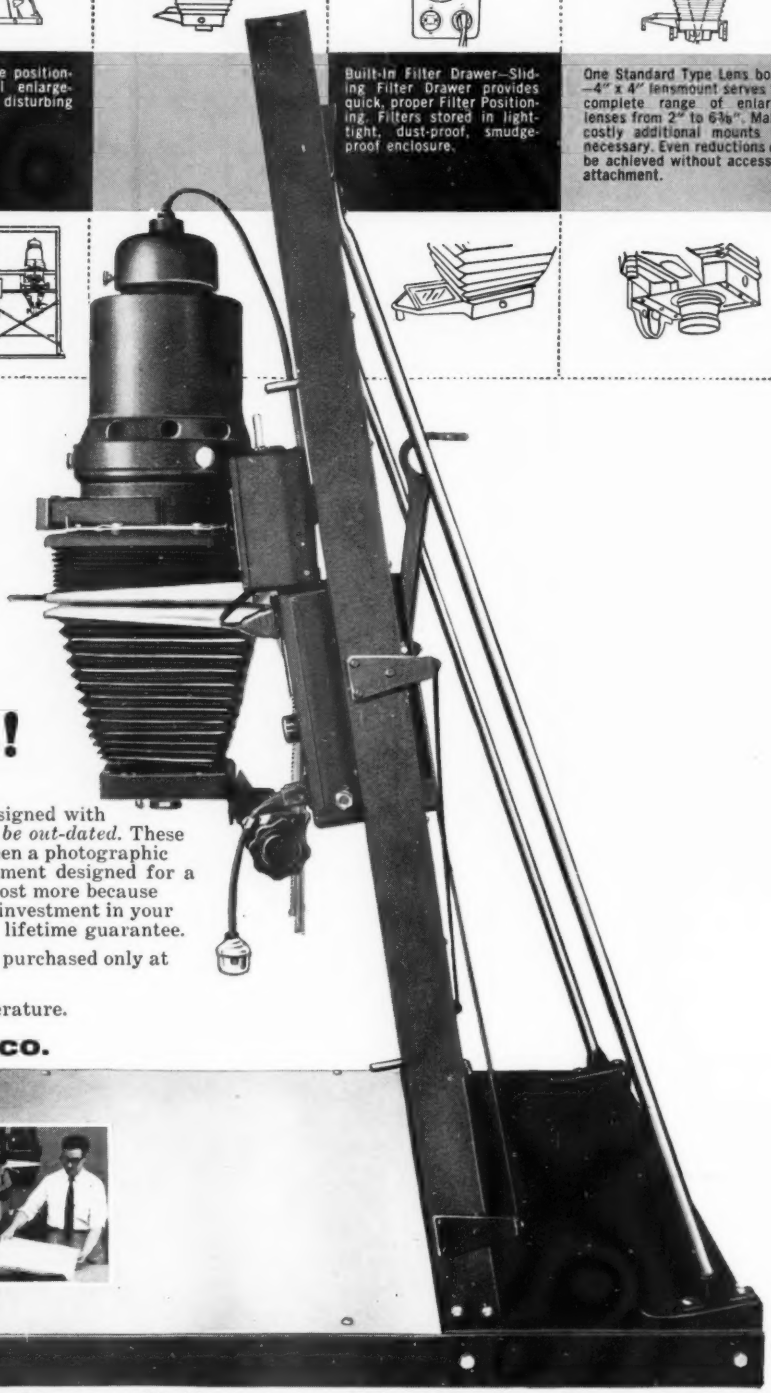
Lateral Lamphouse positioning for sectional enlargements . . . without disturbing easel position.



Built-In Filter Drawer—Sliding Filter Drawer provides quick, proper Filter Positioning. Filters stored in light-tight, dust-proof, smudge-proof enclosure.

One Standard Type Lens board —4" x 4" lensmount serves the complete range of enlarger lenses from 2" to 6¾". Makes costly additional mounts unnecessary. Even reductions can be achieved without accessory attachment.

You'll never outgrow your BESELER!



Charles Beseler Enlargers are designed with advanced features that will *never be out-dated.* These features mark the difference between a photographic novelty and an engineered instrument designed for a lifetime of use. Beseler Products cost more because they are worth more. They are an investment in your photographic future, and carry a lifetime guarantee.

Charles Beseler Enlargers may be purchased only at authorized Beseler Dealers.

Write for complete descriptive literature.

CHARLES BESELER CO.
204 South 18th St.
East Orange, N. J.

Visit the Beseler Dream Darkroom—At the corner of So. Michigan Ave. and East 8th St. (across the street from the Conrad Hilton) Chicago—during MPDFA Convention.

Get more information. Circle 405, page 59

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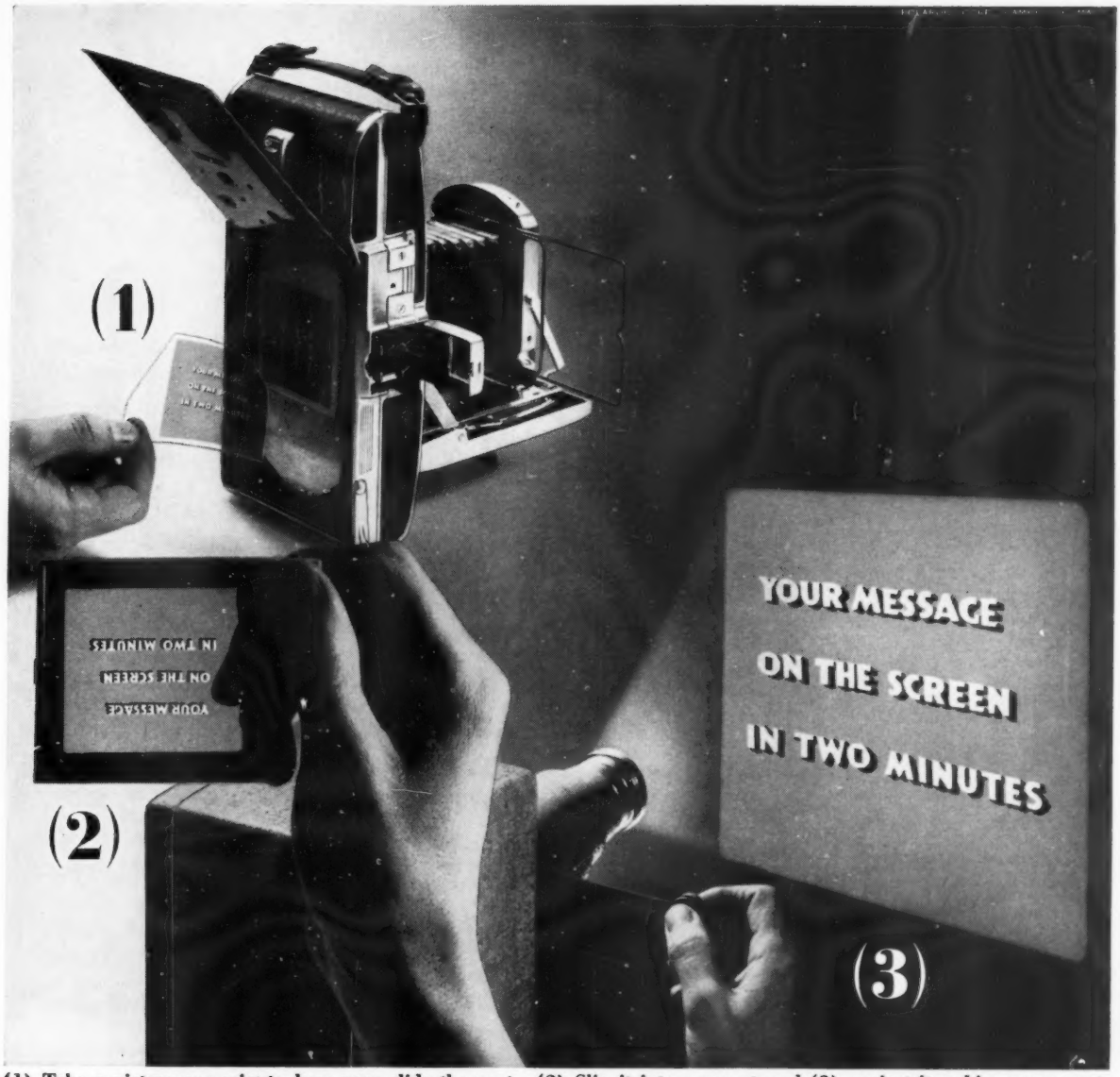

(1) Take a picture one minute, have your slide the next. (2) Slip it into a mount, and (3) project it as big as you want.

Polaroid Corporation Announces

QUICK, EASY WAY TO MAKE SLIDES

Now, with a standard Polaroid® Land Camera you can make slides in an office, lab or plant, and project them immediately.

Polaroid Corporation has perfected a film which produces black-and-white slides right in a *regular* Polaroid Land Camera. Just click the shutter, pull a tab and lift out a transparency of exceptional photographic quality. It's ready to project 20 seconds later, after a quick hardening and mounting in a snap-together plastic mount.

The complete system includes the standard Polaroid Land Camera, the film, mounts, hardener and projector, plus a versatile Copymaker that lets you make slides from any text material, existing photographs, charts, graphs, titles or what have you. You have a choice of two sizes of film—2¼ x 2¼, or 3¼ x 4 (for existing "Lantern Slide" projectors).

These slides cost about one-third as much as conventional slides. But the real saving is in the time and effort that it takes to put a picture on the screen. Send in this coupon for more detailed information.

Get more information. Circle 451, page 59

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Dept. PM-3 Cambridge 39, Ma

Please send me detailed information on the new Polaroid Transparency System.

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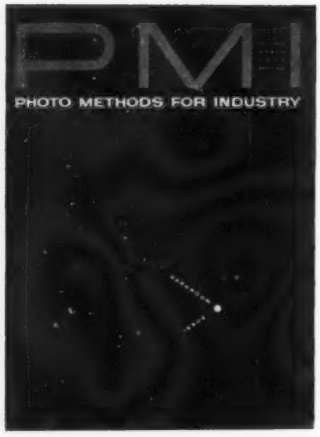
MARCH, 1958

VOL. 1 NO. 3



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When I grow up

Growth considerations are not limited to children. In fact, growth is a prime thought in just about every up-and-coming photo lab where better techniques are a prime aim.

That's why Ansco researched and developed its new Super Hypan emulsion. Super Hypan's phenomenal speed and high image quality permits limitless new techniques for industrial photography.

Here's how; Industrial photographers using Super Hypan at its rated speed of 500 in daylight, 400 tungsten, can work in poorer light and get equal or better quality than ever before. Even higher film speeds of 1000 and more in daylight and 800 tungsten are possible with extended development of this remarkable film.

The industrial photographer can now work in existing light wherever necessary. Or using lighting equipment, he can get greater depth and higher shutter speeds than ever before. In view camera work this means less swings and tilts are needed to "pull in" the entire picture area. Or on difficult shots, smaller apertures may be used to guarantee overall sharpness.

Super Hypan becomes the universal emulsion for industrial work. And when used with Ansco's superb Liquid Rapafix films are cleared in seconds—fixed and hardened in scant minutes. Two great products designed for growth . . . your growth!

Ansco, Binghamton, New York. A Division of General Aniline and Film Corp.

Ansco

Super Hypan

Get more information. Circle 403, page 59

LESS WORK IN THE DARKROOM

NEW

ethol

5

develops more film in less time... cuts down tank cleaning! Gets faster results, easier...

Now, with Ethol 5, you can develop three to five times more film than with any developer of comparable quality before it's time for the chore of cleaning the tank. What's more, you'll get medium fine grain in just five minutes! Superior middle and low tone separation with no high-light blocking . . . low fog level, too. Your time is valuable, so you owe it to yourself to save time by using Ethol 5. There's just nothing else like it!

PLYMOUTH PRODUCTS COMPANY, inc.

1770 W. Berteau Ave., Chicago 13, Illinois

Get more information. Circle 449, page 59

F.Y.I.

When we were a kid we used to wonder how the answers got into the back of the arithmetic book. Did somebody put them there? If so, where did he look them up? And if he looked them up in the back of another book, where did *that* man look them up. And so on.

Well, we've finally found the man who can answer our question. **Herbert P. Paschel,** PMI's graphic arts columnist gives the impression of a man who's never looked an answer up in the back of the book in his life, but he's put plenty of answers in standard reference works for other people to look up. The *Production Yearbook,* bible of the reproduction field, carries his by-line —among others, of course. He also contributes to other standard, indispensable works on the graphic arts field, as well as acting as consultant and trouble-shooter for big printing and lithography houses.

So now we know how to get answers for the back of the book: just ask Paschel. He doesn't ask anybody. He finds out his answers in the field.

Technicians doing their field work at the M.P.D.F.A. show in Chicago, March 17-21 owe it to themselves to visit the working demonstration of Type C equipment at the Grafic Stainless Steel Products plant, 1167 East 43rd St., Chicago 15.

Most photographers do a good job of delivering usable prints to their accounts, but the desk operation sometimes breaks down because company officials don't know what to do with pictures once they get them. The *PPA Management Newsletter* has come through with a list of don'ts for those who send out publicity pictures. It doesn't say anything most of us don't already know, but it's good to have the hints in handy form.

1. Don't ever staple anything to the photograph.
2. Don't ever write on the back of a picture.
3. Leave all advertising matter off the print.
4. Type all release material and captions accompanying the photo.
5. Don't impose upon writers by asking them to send you clippings.
6. Don't restrict newspapermen by making release dates without good reason.
7. Don't try to bribe an editor with a promise of advertising.
8. Don't make retouching obvious.
9. Don't request return of prints after use unless absolutely necessary.
10. Don't send product pictures to publications which do not cover the type of product pictured.

The Charles Beseler Co. had the joy, a few days ago, of seeing the eyes of New York's photographic press come out on stalks. The occasion was a launching party for Slide-O-Film, a new heat-developing film that can be handled under ordinary room light and in a minute makes black-and-white negatives from color slides, projection positives from these black-and-white negatives, or black-and-white positive projection transparencies from any black-and-white negative.

While the Mylar-base film is not exactly unknown to science—it has been around in one form or another for two or three years now—its appearance under the Beseler trademark marks its entry into the photographic field, as distinct from the graphic arts or reproduction field. Even if it were only applicable to duplication of transparencies it would be newsworthy. A little thought though, will result in hundreds of new applications for this handy material: dupe negs, stills from motion picture film, Microfilming, in fact practically any operation that permits exposure by ultra-violet light.

Since the emulsion of this material contains no silver nitrate, it is free of grain; copies on it can be made with higher resolution than that available in the finest-grain materials currently available.

So far Beseler is marketing it only in 35mm and 2¼ x 2¼ sizes. A contact printer-developer is also available. As we go to press, the price isn't set, but it will be about $25.00.

Our apologies to Frank Lewin and E. S. Purrington for misspelling their names in a previous issue. THE END

GREATEST FILM changer ever invented!

GRAFMATIC*

If you, as an industrial or professional photographer, have not yet experienced the advantages of the Grafmatic Film Holder, you should—right away.

Look at the illustration above. You will see that this Holder is, in effect, a precision-made film magazine. It holds six metal septums—each carefully designed to hold one sheet of 4 x 5 film firmly and exactly in the focal plane. Collapsed with the six septums inside, the Grafmatic is scarcely thicker or larger than an ordinary 2-sheet film holder. But what a difference in operation! Simply pulling the change lever out and in, places an unexposed film in place, counts the number of films you have exposed and automatically indicates when film is uncovered and ready for exposure. An exclusive numbering dial even enables an identification number to be photographed on each film.

The ability of the Grafmatic to change film rapidly makes it ideal for sequence shots, for cold-weather outside work, or for just plain faster, more convenient every-day picture-taking. Available in 4 x 5 size (also 2¼ x 3¼) for either Graflok or Graflex Back. Your Graflex dealer will gladly give you a demonstration.

*Trade Mark

Graflex, Inc., Rochester 3, N.Y.

GRAFLEX® *Prize-Winning Cameras*

A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

GPE

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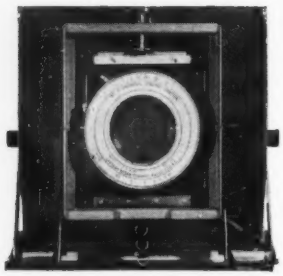
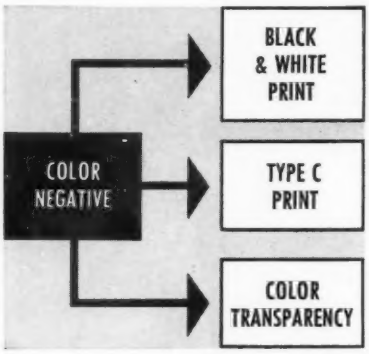


Industrial

A color negative can be like money in the bank on more jobs than you think. From broaching machines to board chairmen, foundries to metallurgical laboratories, research to shipping, there are hidden possibilities for color in every spot in your company.

One negative, three positives

Black-and-white has always been your primary medium. It will be for a long time to come. It's in steady demand and is most frequently ordered . . . but a lot of people are ready to use color, too . . . *if you're prepared to offer it.*



Stop and think for a moment what color could mean to your job . . . the prestige that goes with it. When you make color negatives, you add color prints (and transparencies, if they're wanted) to your existing work.

You work as you always have—with one essential difference: you make color negatives on all jobs that stand to benefit from color. You shoot in color. Then print in black-and-white to meet the specifications of the job, but finish off a color print, too. Show it, and see what happens.

Chances are everyone will be impressed.

The negative side

For cameras that use sheet film in any of the standard sizes from 2¼ x 3¼ up to 8 x 10, order Kodak Ektacolor Film, Type S or Type L. Type S is the new short-exposure type (1/25 second or less) with an ASA rating that puts it right up near black-and-white . . . 25 by daylight, electronic, or "regular" flash. And Type L is the even newer film balanced for normal studio lighting set-ups requiring long time exposures.

For cameras using roll films—116, 120, 127, 616, 620, or 828, Kodacolor Film, balanced for either daylight or artificial light, is the answer to your loading problem. It has a rating of 32.

Because contrast range is comparable to many black-and-white films, in general you can use the same studio light set-ups you would for a good black-and-white picture. Perhaps just a shade more light in the shadows.

Processing in your own studio is not difficult . . . less than an hour, counting washing. If you do not want to do your own processing, the chances are there is a color processing lab in your immediate area that can and will do a good job . . . and give you prompt service.

The negative you get will have the complementary colors of your subject, but otherwise it will be a fully exposed negative with a contrast range similar to that of a black-and-white negative made under the same conditions.

The final clincher

The one thing needed to make negative-positive color completely useful and versatile was a suitable black-and-white paper on which to print color negatives. Kodak Panalure Paper E is the material that fills the bill.

Its introduction at the start of the year marked one of the most important photographic developments since the invention of practical color photography.

It has always been possible to make black-and-white prints from Kodacolor or Ektacolor negatives on Kodabromide or Medalist Papers. They haven't been bad. But they haven't measured up to professional standards. For the most part they were only useful as file prints of your color negatives.

The difference, of course, is that Kodak Panalure Paper is *panchromatic.* It is a fast projection paper. It should be handled under a dark, Series 10 safe-

These pictures were made one on Kodak Royal Pan Film, the other on Kodak Ektacolor Film. Both were printed on Kodak Panalure Paper E.

Round-up

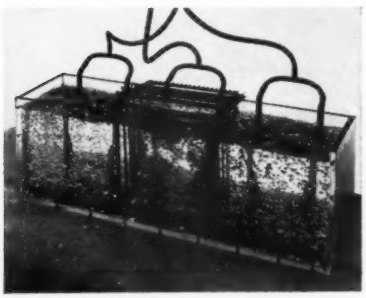
light, or in total darkness (by time and temperature method). Exposure and development are the same as for any standard black-and-white projection paper. Kodak Dektol Developer is recommended for general use.

The print you get is of the finest professional quality obtainable. In fact, many portrait photographers are already using Panalure for their black-and-white portrait prints.

You can see samples at your dealer's. Kodak Panalure is available in popular E surface, double weight—obviously in a single contrast.

The Nth degree, Type C prints

You make a color negative to get a color print. And you can do the printing yourself on Kodak Color Print Material, Type C, without buying a lot of special equipment. One photographer says his total investment was for a set of Kodak Color Compensating Filters and a new tray to replace an old chipped one.



This demonstration shows how bursts of nitrogen agitate Type C prints in quantity production. Tray development is suggested for small numbers.

Printing and processing are more complex than with black-and-white, but not much . . . and long production runs of identical prints are possible with the addition of very little extra equipment.

But negative-positive color offers much more than the opportunity to "do it yourself."

Variations in printing are as many and nearly as easy to achieve as in black-and-white printing. The image can be "cooled" or "warmed" in large or small increments, limited only to the degree imposed by a set of 36 color filters. Control can be exercised over the whole or a portion of the print—for it can be dodged as black-and-white prints are dodged.

Retouching can be done on the color negative with pencil as a black-and-white negative is retouched, or the Type C print itself can be reworked in color by many of the same techniques used in other retouching processes.

When it comes to photomechanical reproduction of a Type C, nothing is left to be desired. Color reproduces beautifully with no special or peculiar manipulations being necessary.

All this and transparencies, too

Your Ektacolor negative can be the source, too, for sparkling transparencies, for display, for slides, or for people who like to look at color with transmitted light. Just print on Kodak Ektacolor Print Film. It's matched to the Ektacolor or Kodacolor negative.

Just a word on your subjects

Anything you photograph on Ektachrome Film is worth a negative on Ektacolor—to give you a file print in color, or to furnish a color print or a multiple order of color prints at a later date. The real plus comes, though, when you are shooting for a black-and-white order. People, of course, always like to see themselves in color. Outdoor shots of plants and offices are often more acceptable in color even though black-and-white was ordered. Machines and equipment which may be considered colorless take on compelling realism in color. Even identification photos become more readily identifying in color. The potential of color is unlimited . . . in its uses and opportunities.

Coast-to-coast eye opener !

Here's a date you can't afford to miss . . . for there must be color in your future . . . and this will show you what it is.

An eye-opening demonstration and exhibition of the whole negative-positive concept of color is coming your way within the next few months. It's the biggest Kodak color show yet to show you where to use it, how to use it, and what it means. Plan now to attend in:

Rochester, N. Y. Hotel Sheraton	March 26
New York City Commodore Hotel	April 2, 3
Boston Sheraton Plaza	April 8
Detroit Veterans Memorial Bldg.	April 15, 16
Chicago Hotel Sherman	April 22, 23
Minneapolis Radisson Hotel	April 29
Seattle Olympic Hotel	May 7
San Francisco Sheraton-Palace Hotel	May 13, 14
Los Angeles Hollywood Roosevelt Hotel	May 21, 22
Dallas Statler Hilton Hotel	May 27
Atlanta Dinkler Plaza Hotel	June 3
Toronto Royal York Hotel	June 11, 12
Montreal Windsor Hotel	June 17, 18

Made together to work together

All Kodak Color Materials are made together to work together, to give you the finest possible results with complete uniformity, day to day or year to year. Ask your Kodak Technical Representative to arrange a color demonstration for you.

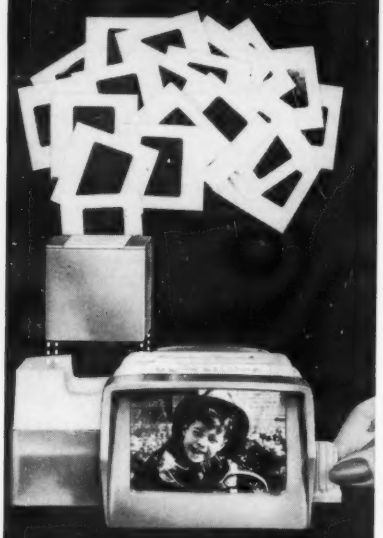
EASTMAN KODAK COMPANY, Rochester 4, N. Y.

Kodak
TRADE MARK

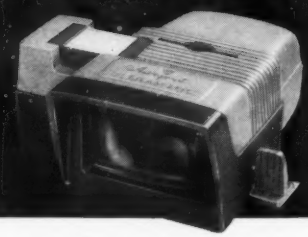
color slides are more fun with . . .

Airequipt

ULTRAMATIC



magazine-load slide viewer shows slides Big, Bright, and automatically



So simple it's almost unbelievable . . . just place your cardboard slides in the magazine . . . slip the magazine into the ULTRAMATIC. See your color slides enlarged 7x! Watch slides feed into the viewer and back into the magazine with fingertip action. Additional indexed magazines store and protect all your slides! $14.95 less batteries; AC model $18.95 with brightness control.

AO38

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Dept. PM3, NEW ROCHELLE, N. Y.
Get more information. Circle 400, page 59

by Samuel Lang & Leonard Zoref

INDUSTRIAL COLOR

The subtle art of transparency doctoring—here's how it's done

We have often been asked what can be done with transparencies that are off color or prove to be incorrectly exposed after processing. Fortunately, there are corrective steps that can be taken. Although many times these corrections will vastly improve the original, we cannot stress too strongly the fact that a transparency shot and processed properly will have finer quality than a doctored one.

Changing color balance

We will start with off-color balance. The first step is to determine what color is lacking and to what degree. This can be accomplished with a set of Ansco CC printing foils which are available in sheets up to 11 x 14 inches. The foils are placed directly on the transparency until one is found that visually corrects it. Now if the filter that accomplishes the correction has a density less than a 20, it can then be taped or bound directly to the transparency, completing the correction. When more than a CC 20 is required, the whites and highlights will usually take on the color cast of the overlay filter.

Heavier corrections can be made by one of the following three methods: The first method employs the use of a color-coupled positive mask. This is accomplished by making a black-and-white contact panchromatic negative using the complementary filter of correction color needed. For example, if more blue is needed, a yellow filter would be used to make the negative. A contact positive is then made from the negative. This positive should be made and developed with a color coupling developer of the designed color.

An alternate method is the use of Dye Transfer matrix film. The matrix film is exposed as before by contact with the negative. It is then developed as per Kodak's recommendations. The next step would be dyeing the matrix film to the exact color that is needed for the correction. The dyed positive is then registered to the original transparency. The advantage here is that the color is added in photographic proportion without staining the highlight areas.

Another method would be duplication. Here again the duplicate could be shot with the desired correction in the light source and highlight clarity retained. A good duplicate should employ a double mask (highlight and flattening).

The use of selective bleaches is still another way of correcting color. This method is a bit tricky but when properly done it can achieve amazing results. The bleach should be used only when the original is too dark, as well as being off color, since the bleaches tend to lighten the transparencies as they subtract the color. The bleach should be tested on a discard transparency as the reaction is somewhat different for various emulsions. We would suggest that you write to the manufacturer of the film you are using for the specific formula you need. Specify the type of film and the age of the emulsion.

For minor corrections another method is sometimes used. A weak solution of Dye Transfer dye can be mixed with a small amount of acetic acid. The transparency is then dipped repeatedly until the correction takes place. If too much dye is absorbed most of it can be removed in a weak carbonate solution and a prolonged wash. A small amount of wetting agent can be added to the dye mixture to enhance even distribution of the dye. The transparency should be pre-soaked in a water plus wetting agent solution. A word of caution about Kodachrome transparencies: Most Kodachrome films have a protective lacquer on the emulsion side. This can usually be removed with a sodium carbonate solution. If this is not done first, uneven dyeing

in the transparency can take place.

When a local correction is necessary it is usually accomplished with a brush application of color. This is usually done only with transparencies 4 x 5 or larger. The color should be applied to the base of the original rather than to the emulsion side. It should be applied in a wash fashion and built up gradually. A good camel's hair brush should be used.

Webster dyes are also used for transparency retouching. Webster has a special color removing solution that is used for removing too much applied color and it is especially useful for cleaning highlight areas.

Correcting underexposure

Another common trouble with transparencies is caused by exposure error. Here again certain methods can be employed to rectify it. An underexposed transparency can be lightened by means of duplication. When the duplicate is made it is merely overexposed to the desired lightness. The use of double masking is highly desirable unless the original is very low in contrast and increased contrast would improve it.

Triple bleaching is another method employed to lighten transparencies. This is an extremely tricky process and if carried too far can cause irreparable damage to the original. Do not attempt triple bleaching when more than one stop correction is needed as the transparency will then become excessively low in contrast and lose saturation in deep colors and blacks. It will have the appearance of an overdeveloped transparency.

Overexposure

The most difficult error to correct is an overexposed original. Attempting to duplicate it with underexposure usually results in extremely flat and muddy transparencies. One method that we know of is to make an exact duplicate of the washed out transparency by contact and then register the duplicate back to the original. Original and duplicate should be emulsion to emulsion to obtain maximum sharpness. The results, when properly matched, will build up color where needed.

Many of the steps that we have described require great skill and care. If any of you have ever had occasion to use a color retoucher, you have found it extremely costly. Yet if the transparency you wish to correct is extremely valuable, we would recommend professional retouching. On the other hand the minor corrections we have mentioned will usually do no harm to the original.

THE END

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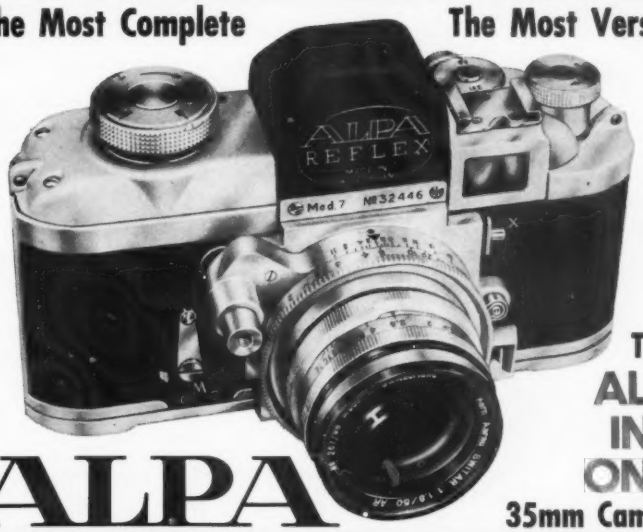

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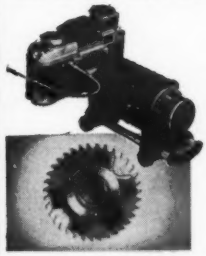

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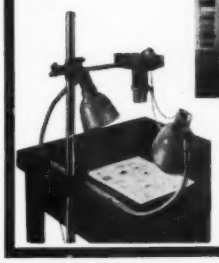

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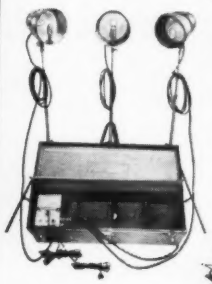

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by Edward R. Farber

ELECTRONIC FLASH

Electronic flash can be as much help in a darkroom as on a camera

Electronic flash can be just as useful in the darkroom as on the camera. Ingenious photographers have adapted its cool quick light for copying, contact printing and enlarging. There is even a commercial sensitometer incorporating a flashtube.

It is as a light source for duplicating transparencies, however, that electronic flash is most useful in the lab. Its color characteristics are ideal for the purpose; its short flash duration eliminates movement and vibration problems and brings about a desirably low contrast copy.

Here is how it is done: Place a piece of opal glass over the light source, tape the transparency to the glass and focus directly on the transparency. For a 1:1 copy, the f-stop would be about 8 when a 200 watt-second power pack is used. Flashing the unit twice makes it possible to shut down to f/11—but be sure to allow the proper recycling time between flashes.

Filters required, if any, are hard to predict. Most workers find that they get a satisfactory color balance without a filter, but variations in opal glass, type of reflector surface, and age of the flashtube, may all result in color shifts. If your tests prove them necessary, 2 x 2 gelatin filters can be used for correction.

Larger transparencies can be illuminated by placing a white card a short distance behind the transparency and bouncing the flash against the card.

American Speedlight Corporation (Ascor) markets a special lamp housing to fit the Omega D2 enlarger, and a Continuous Light Adapter control unit, which enables the flashtube to be used either in the regular manner—to produce a single brilliant flash—or as a repetitive unit, giving two to 120 flashes per second.

The manufacturer cites a typical example: A standard 35mm color transparency in cardboard mount with a "normal" color density (high-*light .50, middle tone .57, shadow* area .72, measured with a Marshall Densitometer) was placed in a 35-mm negative carrier and projected about seven diameters to a full 8 x 10 enlargement, utilizing the "continuous" light source for all focusing. Test exposures produced excellent duplicates at f/22 with the B501 (200 watt-second) power supply set on quarter power.

Most of us regard a sensitometer as an instrument that ought to stay in a research laboratory, but recently Edgerton, Germeshausen & Grier, Inc., have announced a small, uncomplicated and convenient Electronic Flash Sensitometer for the average photo-technician's daily use.

It consists of a small contact printer containing a simple flash unit with three standard exposures (1/100, 1/1000 and 1/10,000 second), a variable area "filter" for intensity control and a No. 2 Kodak Photographic Step Tablet which is contact-printed on the test film.

To determine reciprocity failure film could be tested at all three ex-

Ascorlight, enlarger for color work

posure durations and the results compared. The effect of different developers and developing times is easily checked also. Such controls can be invaluable to those using high speed cameras, photographic recorders (sound and visual) and high speed flash units.

In a paper by Harold Edgerton and Charles Wyckhoff on this Xenon flash sensitometer are some revealing comments on Kodachrome: "When Kodachrome film is exposed for times shorter than 0.01 sec. it is interesting to note the effects of exposure reciprocity failure on the three different layers. The blue sensitive layer is apparently not affected for exposure times as short as 0.0001 sec. The green sensitive layer begins to fail at approximately 0.001 sec. whereas the red sensitive layer starts to fail almost immediately at times shorter than 0.01 sec. . . . In order to bring Kodachrome film into neutral color balance at exposure times shorter than 0.01 sec. it would be necessary to use color correcting filters either over the film or over the camera lens. Thus, for an exposure time of 0.0001 sec. it would be necessary to use a 30Y and a 20M filter to bring the three layers into balance. This results in a sensitivity loss of a factor of two. Compensation must, therefore, be made in taking a picture to allow for this loss."

Edgerton and Wyckhoff have devised a compact unit for making black-and-white transparencies or prints of 35mm slides.

Using a Polaroid Land camera back made for the Speed Graphic, they built a vertical fixed focus camera: a wooden housing with an f/11 lens in a synchronized shutter. The base contains a small electronic flash and a frame over which the transparency lies. THE END

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by Herbert P. Paschel

GRAPHIC ARTS

New techniques make halftone production easier and surer

While it would be a slight exaggeration to say that getting a picture into print is basically simple, it is no exaggeration to say that producing continuous tone images is easier today than it has ever been.

For example, it is now possible for a photographer to make halftone negatives in any sheet film camera, direct from the subject itself. Illustrations of merchandise and other motionless subjects can be photographed directly on Eastman's Kodalith Autoscreen film, thus sidestepping all of the usual photomechanical screen operations.

To understand what these "usual photomechanical screen operations" are, it is necessary to begin at the beginning.

Offset duplicators, in common with larger lithographic and letterpress presses, cannot print a variable ink film—they either deposit an ink film of a certain thickness, or no ink at all. Thus, no tones between black and white are possible on the basis of ink transfer. Continuous-tone images, therefore, cannot be printed directly by these means.

Fortunately, at normal viewing distances the human eye fuses very minute areas of black and white into what appears to be a homogeneous tone. If a continuous tone is broken into a discontinuous image, so that tones are represented by variations in the black and white area relationship, it can be printed in much the same way as line work. Such an image is called a "halftone."

Halftone negatives are made by strictly photographic means in two ways—by special grids in the optical path of the camera, or by using a special, pre-screened film.

The resolution of a halftone screen

MATERIALS, SOURCES & COSTS

SCREEN	RULING (lines per inch)	SIZES	MANUFACTURER OR DISTRIBUTOR [1]	INITIAL SCREEN COST (11x14) [2]	FILM COST (11x14 sheet)
Crossline					
Levy	50 to 200	5 x 7 to 20 x 24	Max Levy & Co. Phila., Pa.	$198.00 [3]	$0.56
Contact					
Kodak Magenta	65 to 150	8 x 10 to 29 x 29	Eastman Kodak Co.	36.85 [3]	0.56
Kodak Gray	150	8 x 10 to 29 x 29	Eastman Kodak Co.	36.85 [3] (150 line)	0.56
Caprock Gray Universal	32 to 175	8 x 10 to 23 x 29	Caprock Developments New York 6, New York	36.85 [3]	0.56
Pre-Screened Film Kodak Autoscreen	133	8 x 10 & 11 x 14	Eastman Kodak Co.	none	$1.03

1 This listing is restricted to products known to be generally available.

2 133 line ruling unless otherwise noted.

3 Glass screens will last indefinitely with reasonable care and can be used for any size negative up to the maximum usable screen area. To avoid embossing, and other screen damage, contact screens should be only slightly larger than the negative size. This would require a number of screens to accommodate a variety of film sizes and raise contact screen costs accordingly.

is directly related to the screen ruling—the greater the number of lines per inch, the greater the number of dots per square inch. Broadly speaking, as the dot count increases, both tone gradation and detail rendition improve. Rulings from 100 to 133 lines are the range suitable for offset duplicators, with 120 line screens probably being the ruling most widely used.

Glass screens

The most common method of preparing halftone images is the glass screen halftone system, the most critical in respect to equipment, skill and the precision necessary for consistent results.

Equipmentwise, the glass screen method requires a process camera with a precision screen holder. To minimize exposure, a high intensity light source, such as carbon arcs, is desirable.

Making a halftone negative with glass screens requires two or more exposures at different lens settings. It is customary to give a white light "flash" exposure at a minumum aperture to create a hard core in the shadow dots. This is followed by one or more exposures, from the original, each at a larger lens opening and decreasing exposure time. It is not uncommon to use a total of four exposures, including the flash, to control the dot values in the shadow, middle tone, and highlight areas of the picture.

The principal advantage of the glass screen negative system is that in the hands of a skilled operator the reproduction characteristics of the halftone negative can be varied over a wide range, through the broad selection of screen rulings and sizes available, and the variety of sensitive materials on the market.

Contact screens

The next most widely used screen system is based on vignetted or graded grids. Contact screens, as they are called, differ from glass screens in that they are on film and have a variable density screen structure. The screen apertures vary from a minimum density at the center to a maximum at the periphery. A weak light, such as would be reflected from the darker areas of the original, is recorded only in the aperture centers, resulting in very small dots. As the light increases in intensity the dots grow in size by virtue of progressive brighter light toward the periphery.

Contact screens for use in the camera may be colored (magenta), or neutral (gray). Neutral screens are required for making direct halftone color separations and certain other applications involving colored copy. Magenta and gray screens are used in a similar way, and work equally well, for halftones from black-and-white originals.

Graded screens must be in intimate contact with the sensitive material during exposure, making a vacuum film holder mandatory. Equipment requirements are less stringent—a process camera does not need the expensive screen mechanism. The illumination levels required are lower—tungsten photoflood lamps will prove satisfactory as light sources.

Camera operations usually require no more than a flash exposure and a main exposure, all at the same lens opening. Contrast is controlled by variations between flash and main exposures. Highlight contrast is enhanced by a brief exposure without the screen in place.

Contact screens have tone reproduction characteristics equal to, or even slightly better than glass screens, but their main advantage is simplicity. In general, contact screen techniques are less sensitive to minor variables than glass screen methods. *(continued on page 18)*

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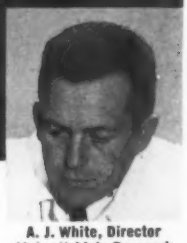

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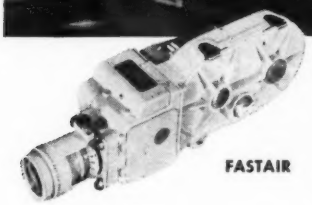

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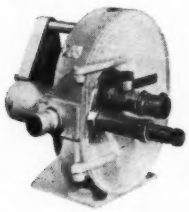

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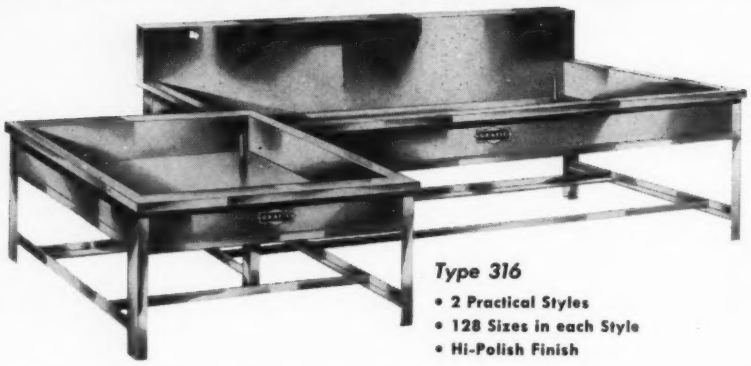

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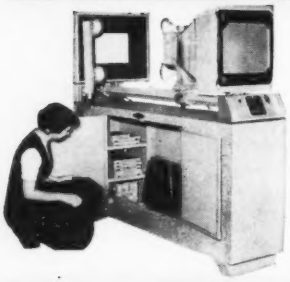

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PHOTO BOOKS IN REVIEW

Focal Encyclopedia of Photography. *Frederick Purves, Editor. The Macmillan Co., New York, 1957. 1298 pages, illustrated. $20.00.*

An encyclopedia is not amenable to review in the usual sense of the term, except to this extent. The reviewer can examine the work carefully, then give his reasons for concluding whether or not (in his opinion) it has merit and is worth possessing as a useful reference tool. I shall reverse the order by stating straight-off that the *Focal Encyclopedia* has real merit. It is a tremendous contribution to the literature of photography, and exceptionally inexpensive: roughly 1½ cents per page. This low figure for a specialized referance volume would hold no significance if the pages were filled with nonsense or contained numerous inaccuracies. But there is no nonsense in this volume, and relatively few errors or misstatements of fact. If this were not so, it would be a sad commentary on the efforts of the ten editors and fifty special consultants who evaluated and put in systematic order 2000 articles contributed by 197 authors from 23 countries.

The magnitude of a publishing project kindred to the *Focal Encyclopedia* can be realized only by those who have had actual experience in putting together 1¼ million words from a large group of contributors. It is certainly no easy task, and minor typographical errors are excusable because they are inevitable. Yet, it is surprising that so many authorities, working together for many years, could not catch such errors as "Anti-halo Protection" (page 38) as the title of an expression to be defined. The light absorbing layers behind an emulsion should hardly be called *anti*-halo protection layers. But don't let this keep you from buying the book. You will have to search hard to find other items that you can criticize with similar justification. LLOYD E. VARDEN

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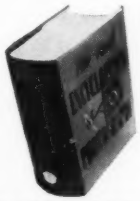
348 

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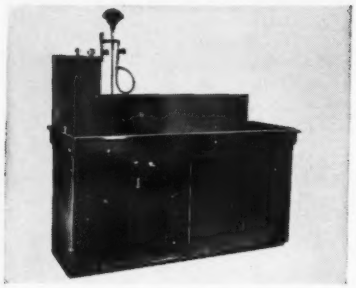

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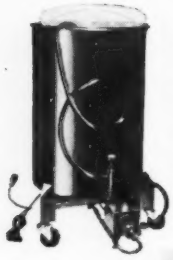

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PHOTO METHODS IN USE

This one-ton pick-up truck has been converted to make a . . .

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In order to photograph farm equipment in actual use during harvest time for advertising purposes, Mr. L. W. Harsh, President of Hydraulics Unlimited Mfg. Co., of Eaton, Colorado, has converted a one-ton pick-up truck into a mobile studio.

Because of the rugged terrain to be covered in taking these pictures, a tempered masonite box houses the camera and equipment.

A pivoting curved top (similar to a baby carriage cover) lifts forward to allow the 8 x 10 Kardan Color Camera, which is mounted on a 756-lb. Gigant Studio Stand, to be used from the inside of truck.

Built into the counter at the back of the truck is a box with changing-bag sleeves. This is kept cool with filtered air from fan next to it.

Cabinets over the counter contain flash bulbs, film, developing tanks and trays, extra tripods, etc. Lenses can be kept in individual wooden boxes lined with sponge rubber.

The mobile unit is also equipped with a radio communication system. When the home plant receives word from dealers and distributors about a particular harvest where their farm equipment is being used, this information is relayed to the truck and Mr. Harsh is on his way, with one of the most imaginative units a professional photographer could use!

GRAPHIC ARTS

(continued from page 15)

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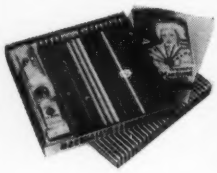

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PHOTO METHODS IN USE

DO-IT-YOURSELF PHOTOMURAL

With a home made mural projector and a little interdepartmental cooperation, employees of the Detroit Edison Co. recently made use of a lobby wall to tell local residents how electricity serves southeastern Michigan.

Locations to be shot were chosen by sales dept. customer contact men, after which photographic dept. photographers made the pictures, using 8 x 10 view cameras to ensure fine quality and absence of grain in extreme enlargements.

These were blown up to wall size by a horizontal enlarger, built by company personnel from the remains of an old 11 x 14 camera. Mounted on wheels that run on a track built into the floor, this mammoth is equipped with a motor cooled 5000 watt lamp and a pair of 14-inch condensers. It can project an 8 x 10 negative to 4 x 6 feet.

Selected negatives were blown up onto the wall marked off into 10-inch squares, for quick measurement and centering. Paper, from 60-inch rolls, was fastened to the wall with push pins.

After development and washing, prints were dried on nylon fabric racks, then resoaked in clear water before mounting on precut plywood

ANCIENT VIEW CAMERA became horizontal enlarger when mural assignment made conversion necessary. 5000-watt lamp develops so much heat that unit has to be cooled by motor-driven fan.

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By ARTHUR ROTHSTEIN

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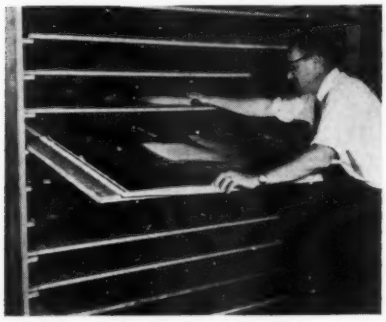
MURAL SECTIONS were so large they had to be developed rolled, in sink. Technique is not a new one, but it is seldom used except in professional photomural production houses.



NYLON DRYING FRAMES held sections after washing. Prints were dried thoroughly, then dampened with clear water for suppleness before mounting on precut ⅜ in. plywood panels.

panels.

Commercial art dept. highlighted and emphasized the mounted pictures with opaque colors. When dry the pictures were spray coated with clear plastic.

Larger section of the mural, on one wall, is devoted to pictorial map of Detroit Edison Co.'s service area, illustrated with art work and blow-ups of the firm's industrial customers. On an adjoining wall, slightly smaller, the same technique was used to feature the company's commercial, residential, and farm customers. Third floor was chosen, for it houses sales department, and through third floor lobby pass many Detroit Edison Co. customers and city officials.

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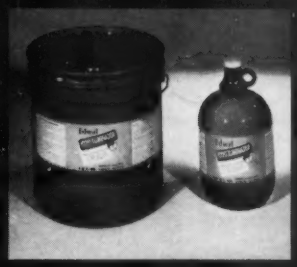

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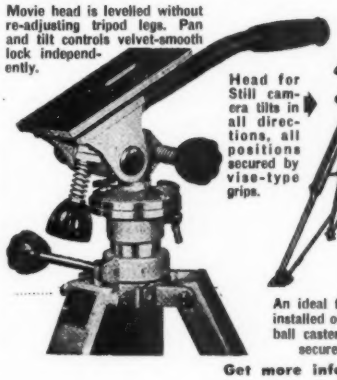

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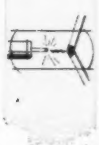

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by Arnold Eagle

INDUSTRIAL MOTION PICTURES

Pans and tilts—how to handle these tricky shots effectively

There are three basic types of movement in motion picture technique.

1. Subject movement. This is mainly the director's problem.

2. Cinematic movement: putting together static shots to produce the feeling of movement. This is the film editor's problem.

3. Camera movement: pan, tilt, dolly, trucking and travel shots. These are the cameraman's problem.

This column will be mainly concerned with the primary camera movements: pans and tilts. I will not repeat the popular beginning for articles addressed to the inexperienced cameraman: "Don't pan."

One of the great frustrations of the photographer in taking a still shot is the fact that he is limited by the picture frame. If he wants to include more, he either has to move back or use a wide-angle lens. It is no wonder that he goes wild for pans when he begins making movies, for now he has a camera with which all he has to do is move to the right or left to include in the shot all that his heart or eye desires.

The place of the pan

The pan has very important and definite functions in film technique. It can be used as an establishing shot to acquaint the viewer with a location. It can lead the viewer to a spot, and stop there. It can add the element of suspense or surprise by revealing a scene to the viewer little by little. It can be used to follow action—a person walking across a room, or a package on a conveyor belt. Unfortunately for beginners, one thing that the pan shot is *not* supposed to do is supplement the wide-angle lens. If a single shot does not cover a subject, in most cases, two or three separate shots would be much better than a panoramic shot.

One of the most restricting factors of the pan shot is its limited use in editing. To the editor, the length of a shot is determined by its importance to the sequence and by the rhythm of the cutting. In other words, its length in the final editing will depend on the length of the shots before and after it. A pan shot cannot be cut. It has to be used from the beginning to the end of the pan. Only very rarely can an editor use a shot in movement and match another shot in movement to it. So, when the editor needs a 6-ft. shot and finds that the pan is 18 ft. long, the pan ends up on the cutting room floor. The only practical advice one can give the cameraman with an uncontrollable urge to pan is: Stay long enough on the beginning and end of the pan so that the editor may cut out the movement and save the two static shots.

Skill and equipment

Panning presents another danger for beginners. Obtaining smooth pans is an extremely difficult art. It usually takes a very experienced cameraman to succeed with them. Even an experienced cameraman will rehearse a pan shot over and over, and make a number of dry runs before actually running film through the camera.

In addition to a skilled cameraman, the most important factor in smooth panning is a steady tripod and an especially good tripod head. The kind of tripod or camera mounting needed will depend upon the weight of the camera and the location of the shooting. There are tripod cranes made especially for studio use and mounted on trucks and dollies, some motorized, with room on them for the cameraman, his assistant and sometimes even the director. These are ideal mounting for any camera movement, but only in the studio. They are too heavy to transport to location unless a very large crew (and budget) is involved.

A good movie field tripod has to have a good pan head, as well as sturdy and adjustable legs. There

are three main types of pan head: the gear head, the friction head and the gyro head. Of the three, the gyro head gives the smoothest tilts and pans. As the head is moved it sets into motion a number of gears that activate a heavy flywheel, which gives the movement a certain amount of momentum. It starts off slowly, reaches speed, and slows down smoothly. This is probably the only type of head with which even an inexperienced cameraman can get a perfectly smooth movement. It does have a few drawbacks, though. It is heavy, it is expensive and it makes a whizzing noise which rules it out for lip sync sound.

The friction head tripod is the most used one. Its frictional resistance should be even and free from rough spots. It should have separate locks and variable tensions for horizontal and vertical movements.

The gear head consists of a vertical and a horizontal worm gear drive, both operated by hand cranks. Some cameramen who have learned to use it swear by it as the most practical tripod head. It also has some drawbacks: It is slow, and sometimes, to operate both cranks and start the camera at the same time, three hands are needed.

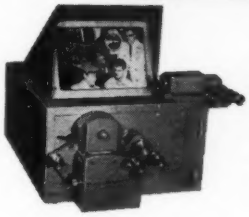
The two-way spirit level is another very important feature of every movie tripod. This level must be checked every time the tripod is moved or raised. Besides insuring true vertical lines, having the tripod level prevents a long pan from going up or downhill, which will happen unless all is perfectly squared. Most movie tripod pan heads are easily removed and can be placed on a short-legged tripod, about 24 inches high, called a baby tripod. For extremely low shots they can be placed on a short cast iron hi-hat.

Panning technique

You can recognize a good cameraman by the steadiness of his pan. The pan movement has to be slow, steady and even. It must come to a definite stop. One cannot overshoot the mark, then try to back up, or stop, change one's mind, and pan a little more. To effect a good pan the cameraman uses his whole body as an extension of the tripod. He plants his feet solidly on the ground, wraps his hand around the camera, rests the long tripod pan handle on his shoulder or under his armpit and swings his body around gracefully, shifting his weight from one foot to the other. It is practically impossible to obtain a smooth pan when you have to walk around the tripod. Your feet should remain in one spot.

THE END

CECO is happy to SELL
—just as happy to RENT
the world's finest Cameras
and equipment



Some companies prefer to make outright purchases. Others, including the top studios, realize that it just isn't economical to buy everything. Every CECO rental is checked out for accuracy and performance by factory-trained experts before you get it. For superior film making, use CECO service for cameras, dollies, tripods, blimps, lenses, viewers, generators, lights, recorders, mike booms—you name it, we have it. For Sale or Rent.

16mm Professional Film Viewer

Easy threading, portable, will not scratch film. Views film left to right on 6"x4½" brilliantly illuminated screen. Sound Reader and/or Counter easily attached. Available in 35mm.

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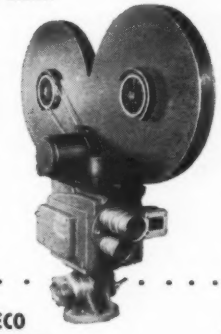

CECO Auricon Cine—Voice Conversion

Cine—Voice Camera modified to accept 1200-ft, 600-ft, and 400-ft magazines; has torque motor for take-up. Includes Veeder footage counter.

$450.00 Conversion only—less magazine.

Professional Jr.* Tripod on CECO 3-Wheel Collapsible Lightweight Dolly

The *newest* PRO JR. Tripod features simple camera attaching method, telescoping pan handle with adjustable angle, pan tension knob, cast-in tie-down eyelets, and self-aligning double leg locks. PRICE $150.00

3-WHEEL DOLLY collapses into compact shape. JUNIOR weighs 15½ lbs. SENIOR weighs 18 lbs. Any tripod easily attached. Ball bearing locking rubber tired casters with indexing device.

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Get more information. Circle 408, page 59

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Get more information. Circle 411, page 59

EXCLUSIVE WITH G.E.!

First miniature flashbulb that lets you catch high speed action!

Introducing new G-E POWERMITE M5

ACTUAL SIZE

All the lighting punch and versatility of a #5 Bulb . . . and only ¼ the size!

Meet the newest member of the G-E PowerMite family – zirconium-filled PowerMite M5–a new miniature bulb that allows shutter speeds up to 1/500 sec! You get the full "M" synchronization (20 millisecond delay) of the #5 flashbulb at *all* shutter speeds.

Used in a 3-inch reflector, the M5's 16,000 lumen-seconds give the same exposure guide numbers as a #5 in its reflector–with all the compactness and convenience of the small PowerMite bulb. Your photo dealer will soon have General Electric PowerMite M5's and M5B's (for daylight color film). Look for Mr. PowerMite on the pack.

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Get more information. Circle 421, page 59

AN EDITORIAL

CREATIVE CONSISTENCY

BECAUSE THE DARKROOM in industry, government and science exists for its utility, the masters of its arts and crafts owe themselves a special frame of mind toward its materials and processes. The men and women who work by the dim, colored lights of the functional darkroom are acknowledged experts. As experts they must be particularly tough minded about their photography. This tough mindedness extends to their materials, their processes and themselves. It applies specifically to those sometimes opposed concepts, consistency and flexibility.

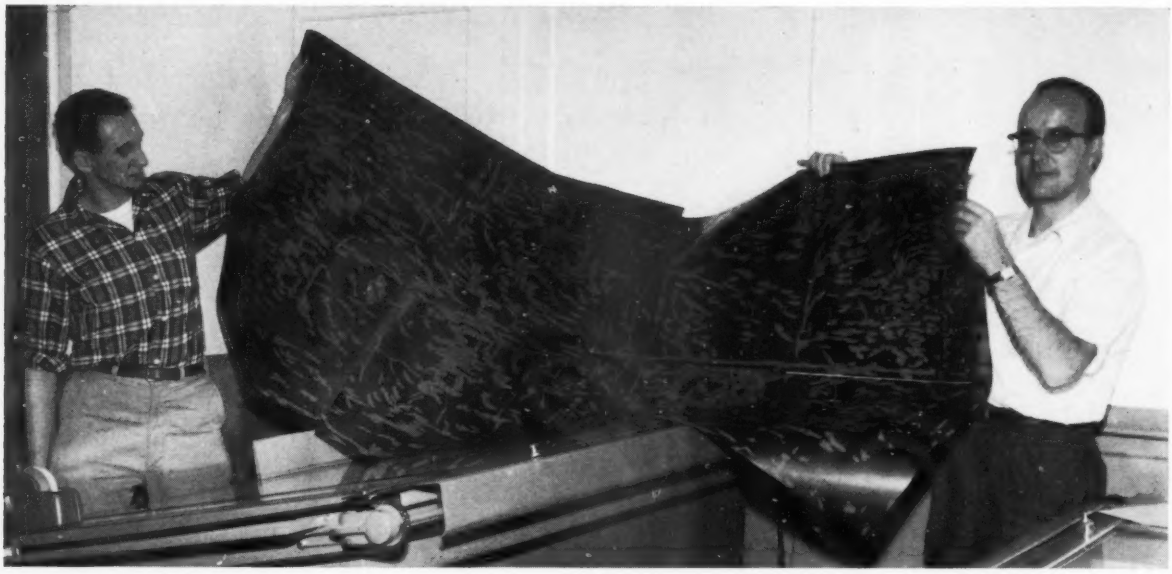
Functional darkroom processes must be consistent. The amount of work done, the amount of material consumed by even a medium-sized unit is sometimes staggering. It represents vast amounts of money, time and talent. For this investment to be exposed to the hazards of inconsistent procedure, untried schemes, faulty equipment, is—from a professional point of view—unthinkable.

But the professional must be, and usually is, pretty hard headed about his own consistency. He welcomes the changes of a constantly improving photographic technology with an open mind, a close look and a fair trial. He is engaged in a continual search for new methods which might benefit himself, his work and those whom his images serve. He guards against the ever-present danger of developing sentimental attachments to customary methods and materials, because they happen to work or because change is sometimes tough. Periodically, he submits his operations to an objective self-examination. He is, as any professional should be, a reasonable admixture of the consistent and the flexible.

The Editors

POCKET-SIZED LAB HANDLES BIG JOBS

Three years ago Wright Aeronautical Corp. spent $20,000 on graphic arts darkroom. Unit has since paid for itself, streamlined staff developed clever ways to fulfill outsize book and engineering-drawing assignments.



COMPOSITES STRETCH CAMERA AND DARKROOM FACILITIES TO LIMIT

JUMBO NEGATIVE, called a "composite" be- ➧ cause it is formed of numerous 24x30 sections, sometimes reaches a length of eight feet, covers a complete aircraft engine. Too large to print on standard offset presses, composites have to be reproduced by blueprint department. Cumbersome jobs of this sort turn up so often, lab staff is used to them.

PAPER-COVERED PLYWOOD serves as copy ➤ board when large rolls of engineering "copy" must be shot. Consensus is that it isn't elegant but it works. Overlapping sections are photographed with 30x30 Robertson Tri-Color Process Camera, at right. Three stripping tables share room.

Setting up their own graphic arts department has paid dividends for the Curtiss-Wright Aeronautical Divison, Wood-Ridge, N. J. Here they prepare line and halftone negatives for illustrating the firm's technical manuals, sales brochures, and other printed matter, with two-thirds of their workload devoted to overhaul manuals.

Built like a watch—its entire area only adds up to 800 sq. ft.—the installation is so neatly and efficiently designed that Sterling B. Martin, who set up the unit, and his aides turn out over 36,000 finished negatives a year. Approximately 90 minutes after the copy is shot the finished, stripped negative is ready to go to the engraver.

Self-supporting

The original investment was only $20,000 when the lab went into operation three years ago. Since then, charging only for materials and labor, it has not only paid for itself many times over in savings, but recovered almost all of its operation costs from the budgets of other departments. Even if a moderate profit were charged—which is not contemplated—fees for graphic work within the organization would still be considerably lower than those charged by outside labs.

The 40 x 20-foot floor space is divided into two main sections. In one there are three negative retouching tables, a 40″ x 48″ copy board together with its lighting assembly, and the front of a Robertson Tri-Color 30″ x 30″ process camera. Lenses are 19″ and 30″ Georz Artar Process.

The second section is set up as a darkroom, and incorporates the back of the process camera, with its operating controls, as well as the negative processing equipment. Both black-and-white and four-color separation negatives are produced, for reproduction by letterpress or offset.

Copy rolls in

Any graphic arts lab working for an organization the size of Wright Aeronautical can count on getting some challenging jobs. One of the most awkward that comes up regularly is the preparation of continuous negatives from rolls of engineering drawings, called "composites" often seven or eight feet long. These are shot in four or five sections, 30″ to a section (on 24 x 30 film) opaqued, and joined. Since the largest printing surface in this normal work measures 24 x 30, the resulting composite has to be printed by the Blueprint Department.

Since the bulk of the lab's work comes from the production of negatives for engine overhaul manuals they have evolved some ingenious shortcuts for doing large-scale book work. Military specifications, to which *(continued on page 54)*

SCALED TEMPLATE AND GUILLOTINE SPEED WORK ON MILITARY MANUALS

OUTSIDE AND TOP in register as copy sheets are shot two-up on 12x18 film, scaled template assures proper gutter size. Specifications require 8½x11 negatives.

POWER CUTTER TRIMS 200 negatives at one time, saving man-hours and turning out neater, more uniform work. Lab employees received suggestion award for the daring time- and money-saving idea.

DARKROOM SINKS

Never have demands on technical facilities been as great as they are now. For today's complex photography the darkroom operator must be an expert, must have an expert's tools to work with. The pace is too fast to make allowances for the occasional *(continued on page 55)*

ADLER'S METAL WORKS

MATERIALS	SIZES	FEATURES	ACCESSORIES	STAND	PRICES
18-8 austenitic grade stainless steel	Four stock sizes: 24" x36"x10"; 24"x48"x10", 24"x60"x5", 24"x84"x 5"	All seams inert-arc welded, ground, polished and acid-passivated. Roll rim at front working edge. Siphon action drain. Rounded cove-corner construction, right angles eliminated from metal intersections of sink body. Sink lifts off base for handling.		All-welded angle stand, legs fitted with Adler box-type floor leveling device. Stainless steel cabinet bases also standard.	

ARKAY CORPORATION

Type 316 stainless steel	16½"x24⅜"x2" (or by 4")	Portability. Arkay portable sink is intended as auxiliary fixed unit, to contain overflow washer, or for other darkroom uses. Double lockseam construction to insure rigidity.	Model 58D Film Washer	Heavy gauge steel with welded corners, finished in pearl grey baked-on enamel. Adjustable leg bolts and full lower shelf for storage. Working height, 30" from floor.	Portable sink, 2" deep, $25.95, 4" deep, $29.95. Stand, $23.45

BAR-RAY PRODUCTS, INC.

Lamination: Type 316 stainless steel bonded to insulation and structural material. Stainless steel on all exposed surfaces.	Insulated Sink: 32 stock sizes, from 24"x 36"x5" to 36"x114"x 5".	For all photographic and graphic arts uses where heavy construction is essential. All backboard controls and accessories will be factory installed at price of fixtures alone. Can be ordered with dimpled bottom to eliminate need for duckboards.	Positive temperature control valve, vacuum breaker, flow valves, shut off valve, thermostatic control valve, pressure regulating valve, dial indicating thermometer, safelight.	Stainless steel frame, wood, or stainless steel cabinet base.	Sample price: 30"x72" x5", $576.00. Crating, $28.00.
Lamination: Type 316 stainless steel bonded to insulation and structural material. Stainless steel on all exposed surfaces.	Temperature Control Sink: Six stock sizes: 30"x72"x5" to 48"x 136"x5".	For photographic and graphic arts purposes requiring year-round maintenance of exact temperature. Tolerances plus or minus ½°F. On delivery these units require only field connections of water, drain, and electricity.	Temperature control valve, refrigeration and heating equipment as needed, jet water inlets, spray rinsing, turbulence washing jets, wet or dry squeegee boards.	Available with stainless steel frame, or wood or stainless pedestal-base cabinet.	Sample price: 30"x72" x5" on stainless steel frame, with 20 gal. per. hr. refrigeration unit, $1120.00. Crating, $56.00.
Stainless steel, 316.	Round-Cornered, or square cornered sinks; 32 stock sizes from 24"x36"x5" to 36"x 114"x5".	As Insulated Sinks	As Insulated Sinks	As Insulated Sinks	Sample price, 30"x72" x5", square cornered, $480.00; round-cornered, $528.00. Crating on both, $28.00.

CALUMET MANUFACTURING CO.

Type 316 stainless steel.	34 stock sizes, from 18"x36"x7" to 47"x 120"x10".	Calumet Improved All-Purpose Sink supported at 18" intervals by heavy-duty angle-iron frame, galvanized and painted. Stainless steel wrapped around top angle of frame, so all surfaces are smooth. Sinks supplied complete with standard drain and standpipe.	Stainless steel duckboards, stainless steel 9" splashboards.	Legs of heavy formed steel finished in grey hammertone baked enamel, easily detachable for passage through narrow doors. Legs have gussets 8" from floor, for shelf. Sink ledge 36" from floor.	Sample price: 18"x48" x7" All Purpose Sink, $125, F.O.B. Chicago.
Type 316 stainless steel.	28 stock sizes, from 18"x36"x7" to 47"x 120"x10".	Calumet Improved All-Purpose Stainless Steel Sink, with splashboard and Calumet Temperature Controller. Features as All-Purpose Sink.		As All-Purpose Sink	Sample price: 18"x48" x7", $274.00 F.O.B. Chicago.
Phosphate zinc-coated steel.	24 stock sizes, from 15"x36"x9" to 30"x 102"x7".	Calumet Economy Sink. Though not intended to hold chemicals, coating creates corrosion-resistant finish, which can be preserved by painting with black asphaltum, to prolong life of sink.	Drain and standpipe.	Legs included in price. Working height 36" from floor.	Sample price: 15"x48" x9", $48.00. Crating $5.50 extra.

steel.	15"x36"x9" to 30"x 102"x7".	Calumet Economy Sink. Though not intended to hold chemicals, coating creates corrosion-resistant finish, which can be preserved by painting with black asphaltum, to prolong life of sink.	Drain and standpipe.	Legs included in price. Working height 36" from floor.	Sample price: 15"x48" x9", $48.00. Crating $5.50 extra.

OSCAR FISHER CO., INC.

Type 316 stainless steel.	41 stock sizes, from 24"x36"x5" to 36"x 120"x10".	Heli-arc welded seams, exclusive curve-clean corners, roll rims, die-sumped drain outlet, siphon drain, insulating anti-condensation undercoating.	Temperature control unit, maintains tempered water to within plus or minus ¼°F. Water filter, refrigeration and heating units, foot-control drainboard with frosted glass surface, fluorescent lighting.	Stainless steel leg or cabinet base. Leg bases have leveling screws.	Sample price: 24"x36" x5" on leg base, $297.00.

GRAFIC STAINLESS STEEL PRODUCTS, INC.

Type 316 stainless steel.	256 stock sizes, from 18"x35"x4" to 36"x 119"x10", splashboard and walk-around.	Exclusive No-Drip Lip.	Powers Fotoguard Thermostatic Water Mixer, wooden duckboard with stainless steel nails, all-welded stainless steel duckboard; chromed brass standpipes, rubber plug to fit all Grafic 1½" drains. 1½" special alloy stainless drains with locknut and washer; stainless steel partitions.	All-welded hot-rolled angle-iron stands with corrosion-resistant coating; 1¼" pipe legs. Stainless angle stands also available on order. All have levelling devices. Height of sink ledge, 38" from floor.	Sample price: 18"x47" x10", with stand, $152.00. Crating costs 8%.

KREONITE, INC.

Corrosion resistant glass reinforced resin.	16 stock sizes, other sizes and shapes to order.	One-piece moulded construction, rounded edges and corners. Come in three colors; white, pastel green, and brown. Material has low heat-conduction, anti-condensation. Resilient material cuts down breakage.	Temperature control, filters, faucets and plumbing fixtures, developer spigot, nitrogen burst valves. Sinks for graphic arts use available with safelight illumination through bottom of trays.	All models available with metal or wood stands, metal, wood, or birch cabinets. Height of sink ledge, 39" from floor.	Sample price: 17"x48" x10", with metal or wood stand, $236, F.O.B. Wichita, Kan.

LEEDAL, INC.

Type 316 stainless steel.	62 stock sizes, from 22"x36"x5" to 47"x 120"x10".	One piece heli-arc welded construction, with rounded corners. Under-surfaces and back anti-condensation coated. Body laterally braced to prevent bulging at full load.	Stainless steel removable standpipe, towel bar, duckboards, (wood or stainless steel) storage shelves (zinc plated or stainless steel) thermostatic water mixer, drip guards.	Electro zinc plated, swivel ball-jointed leveling screw in all legs. Matching shelves available. Working height, 38" above floor.	

P&H SALES CORP.

Stainless steel.	Type HD: 12 stock sizes, from 23"x36"x 6" to 47"x120"x8".	Heli-arc welded joints. Special alloy drain fitting and stainless steel overflow standpipe are taper fitted. Underside of sink anti-condensation coated. Available with or without 8" stainless steel splashwall.	Integrated cabinet and efficient refrigeration unit convert Type HD sink to Type HC.	Welded pipeleg stand, with adjustable floor-leveling flange bases. Stand coated with rubber-base acid-resisting enamel. Working height 38" above floor.	
Stainless steel.	Type RB: 12 stock sizes, from 23"x36"x 6" to 47"x120"x8".	as Type HD.	Full storage area in cabinet with sliding doors. Can be equipped with Thermostatic Temperature Control Water Mixer.	Storage cabinet. Working height, 38" from floor.	
Stainless steel.	Type GP: 12 stock sizes, from 23"x36"x 6" to 47"x120"x8".	Double-seam joints, with enclosed angle-iron support around sink. Special alloy drain fitting. Anti-condensation coating on underside of sink. Available with or without 8" splashwall.	Drip guard, hanging stop sink, stainless squeegee board, whirlpool agitator.	Welded angle-iron stand with leveling screws. Stand coated with rubber-base acid resisting enamel. Sink removable. Cabinet may be built around stand. Crossbars add strength, can be used to support shelf. Working height, 38" from floor.	

PORT OF N.Y. AUTHORITY

Truck, bus, train, plane, and ship terminal facilities in the busiest port in the world furnish tasks for this 22-man lab. By Edna Bennett

The Port of New York Authority operates nineteen terminal and transportation facilities, which include six interstate bridges and tunnels, four airports, a midtown heliport, four marine terminals, two union motor truck terminals, a union railroad freight terminal for consolidation of rail freight and a union bus terminal.

The Port Authority takes its place with the most up to date industrial corporations in its extensive use of photography as a general administrative tool. Its Photograph Section provides a complete, centralized service to all units of the Port Authority—document copying by photostat, press photography, legal, architectural, industrial, graphic, serial and motion picture and presentation of motion picture and slide projections.

In the Section we find a group of 22 workers who perform the myriad tasks necessary to the yearly production of 90,000 prints, 7,800 negatives, 6,700 feet of motion picture film as only a portion of its work. Some indication of the amount of work done can be gained from the fact that there are days when 3,000 press release prints must go through the lab. The belts on the glossy dryers have to be changed every three or four months, when the usual lifetime of a belt is from 10 to 12 months.

Housed on the 9th floor of the Port Authority Building in New York City, the Photographic Section is divided into four operating units—all under the keen eye of Robert Handley, Supervisor of Photographic Services. The Photographer Unit has five men including a Chief Photographer. The Photo Lab unit consists of Rogers Thorpe, Lab Chief, and eight laboratory technicians plus two reproduction aides and one photostat operator,

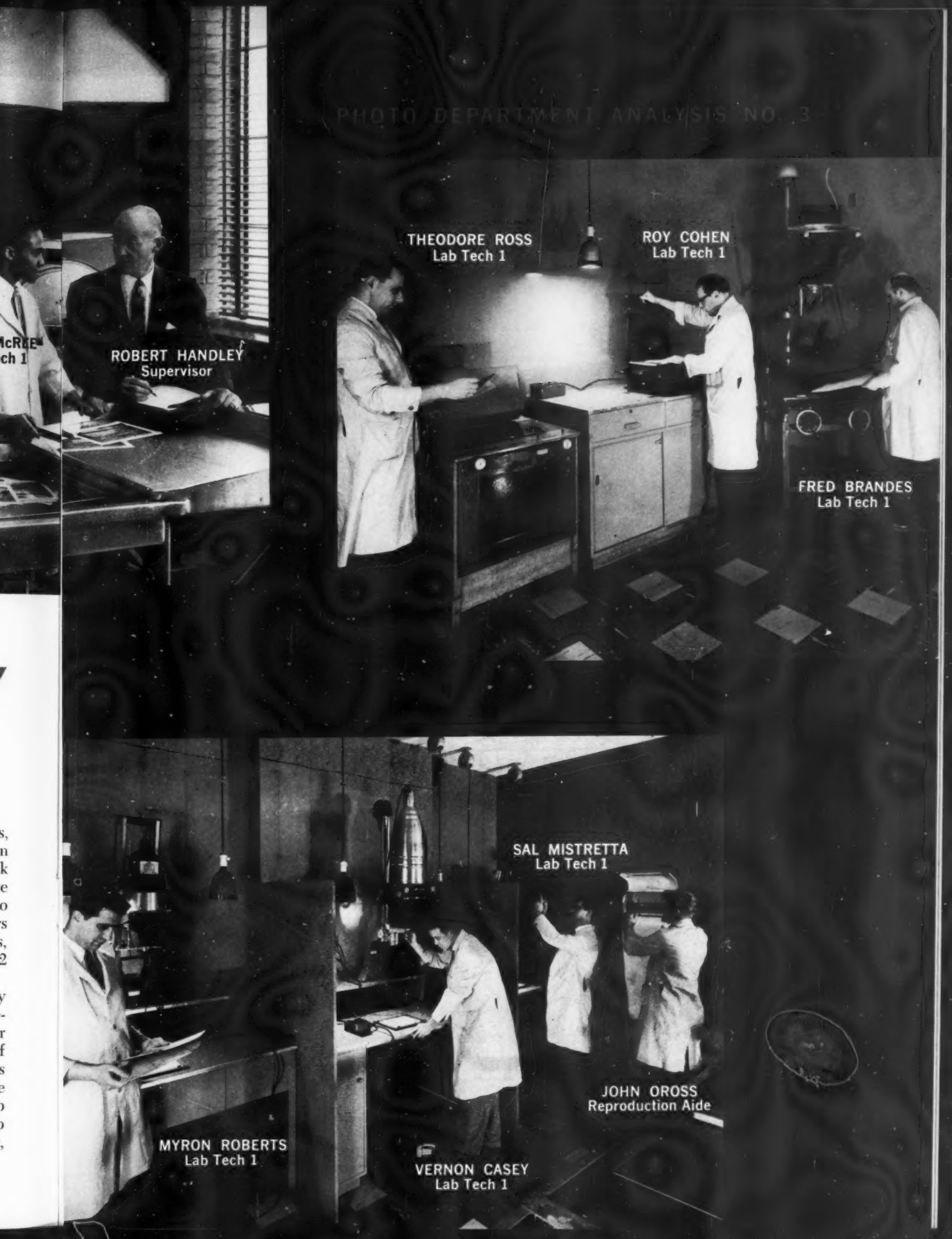


PHOTO DEPARTMENT ANALYSIS NO. 3
ROBERT HANDLEY
Supervisor
THEODORE ROSS
Lab Tech 1
ROY COHEN
Lab Tech 1
FRED BRANDES
Lab Tech 1
SAL MISTRETTA
Lab Tech 1
JOHN OROSS
Reproduction Aide
MYRON ROBERTS
Lab Tech 1
VERNON CASEY
Lab Tech 1

who handles the document copying machines. Three clerical workers and a photo classifier make up the office unit.

Efficiency first

The Photographic Section occupies 5,200 square feet of space—the design of its various units is the result of the combined efforts of Mr. Handley, his workers and the engineers. Mr. Handley is quick to admit that the Lab incorporates not only their ideas but any others they were able to gather from similar photographic units in various parts of the country, to achieve the basic objective of production efficiency with a minimum of lost motion. The entire lab is air conditioned. Powers valves regulate the temperature of the water which is usually kept around 68 degrees.

Each lab room is illuminated with safe light units in the ceiling and many adjustable reel safe lights which can be easily moved. These reels with retractable cord can be bought in any industrial electrical supply shop—in many sizes. The safe light unit is just screwed into the socket on the end of the cord, making one of the most versatile tools in the darkroom. The light green chemical-resistant paint and the white acoustical ceiling tiles aid in the even distribution of available light. Labyrinth light traps instead of doors are used for access to the general lab area. The light traps were painted with matte black to prevent outside light being reflected into the darkroom. Sliding doors are used for the film developing rooms. As the door closes a light goes on in the corridor which spells IN USE. There are no locks on any doors in the lab.

In all the lab rooms, the "white light" switch is placed higher than normal and has a brass guard around it so there is no possibility of putting it on accidently. These guards can be obtained from any electrical supply house.

Neatness too

Mr. Handley points with pride to the roller-type linen towel units which he has found to be more practical than paper or single towels. There is a towel unit wherever there is a sink operation. Thus is eliminated the badge of the old-time darkroom worker—the stained, damp towel slung over the arm. Another darkroom symbol, the overflowing waste basket has been banished. Paper waste is put temporarily in the utility sink and then passed through the chute to the receiving tray. A lab worker in the finishing area puts the waste into stainless steel containers. This method has a two-fold purpose—to keep the darkrooms clean and to centralize the waste in one area.

PORT OF N.Y. AUTHORITY'S OWN EXPOSURE AND DEVELOPING INDICES

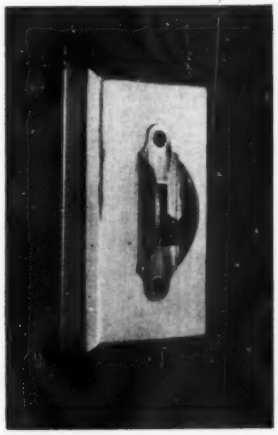
FILM	ASSIGNED RATING	DK-50	D-19	PROMICROL	PRA	D-76	D-23	PURPOSE
SHEET								
Royal-X	1200-1600	7				12		Available light
Royal Pan	200-400	7			8-75°	12		Basic with Graphic
Super Panchro-Press Type B	100-200	7				12		Used very little
ROLL								
Tri-X	650-800			11		11	12	Available light
Verichrome Pan	100-200			10		10	12	General use
Panatomic-X	80					9		Used very little
35MM								
Tri-X	650-800			11		11		Available light
Plus-X	100-200			10		10	12	General use
AERIAL								
Aero Graphic XX	200	6	6			10		Aerial

* These are approximate developing times. Each photographer makes his own adjustments.
** Aerial film is usually processed in D-76. If an overcast day, film is rated at 400 and developed in D-19. High altitude exposures are developed in DK-50A for contrast.

THESE MAKE FOR EFFICIENCY IN PORT OF N.Y. AUTHORITY'S LAB

STRATEGIC placement of darkroom lights adds to the efficiency of the Port of New York Authority printing darkrooms. Processing is timed by clock illuminated with filtered light. Recessed ceiling fixture has lens which directs bright white light on hypo tray for judging prints but does not scatter to other areas. Light is operated by insulated foot switch to prevent shock.

EXTREME blow-ups of large negatives are accommodated easily by this adjustable easel baseboard. The baseboard rests on grooves which are varying distances from the enlarger head. Not only does the system allow Port of New York Authority printers to increase the maximum size of enlargements without taking additional space in darkroom, it keeps easel rigid and aligned with enlarger head.

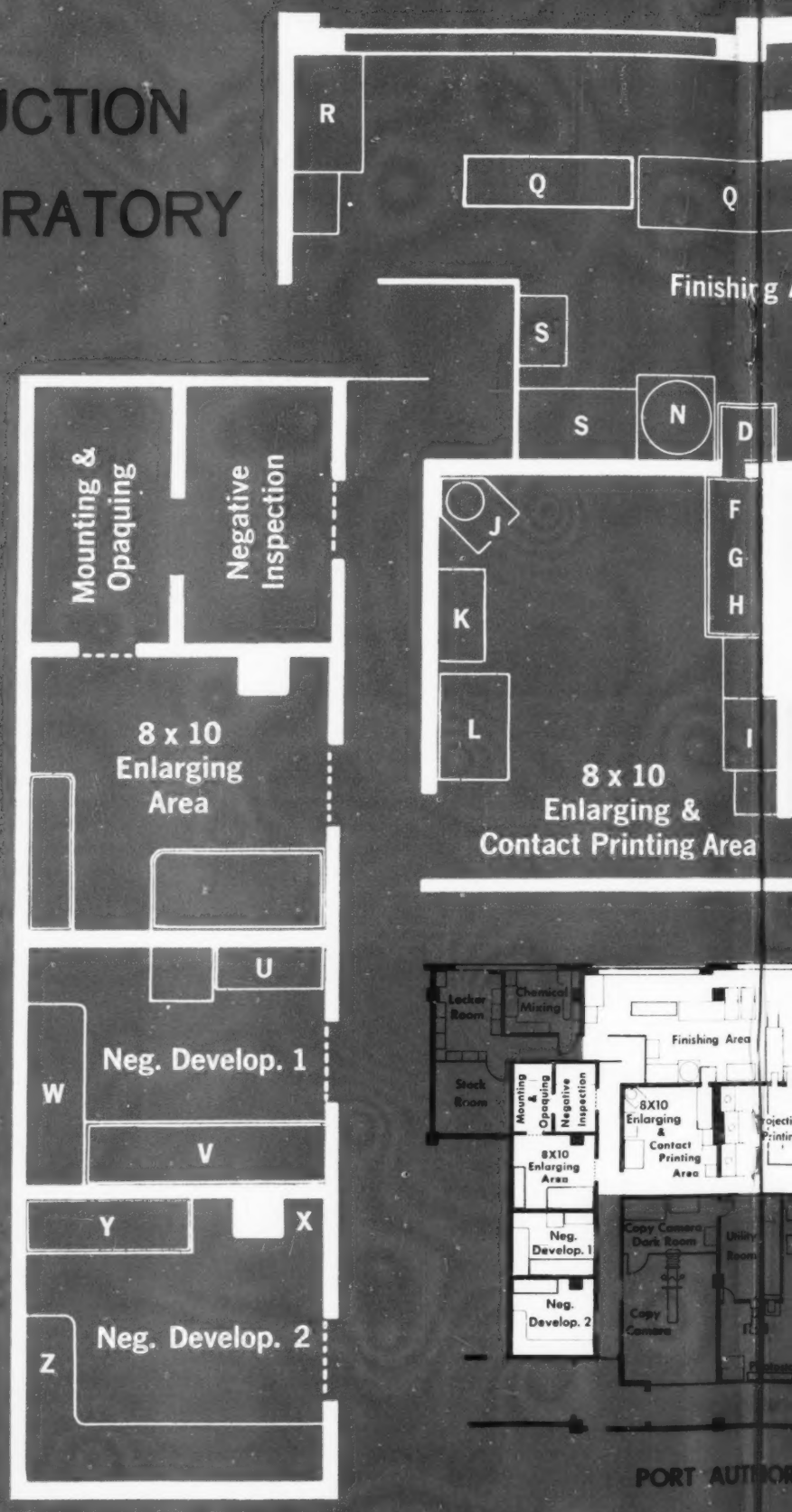


SAFETY guard on light switch (*left*) is a precaution against accidentally turning on white lights in darkrooms. Switches themselves are placed high on the walls for additional safety. Safelights are strung from reels (*right*) so their height can be adjusted according to the needs of the darkroom operator. Both devices are commercially available.

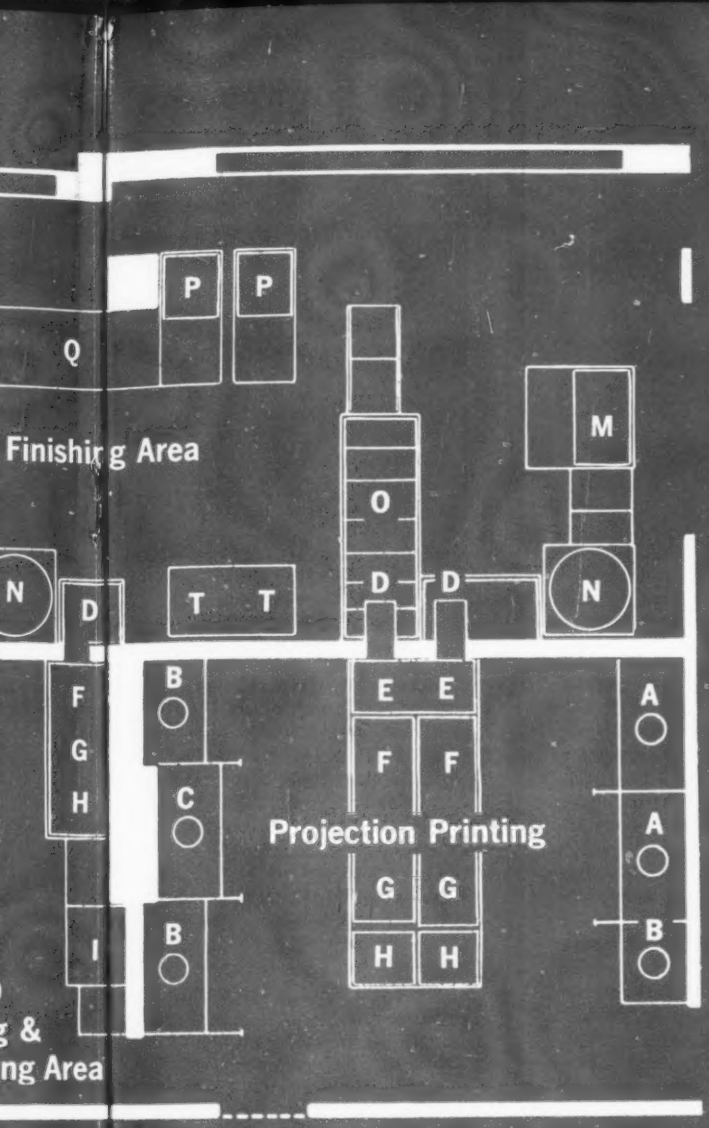
ENLARGER CONTROLS consist of two foot switches. One is depressed to turn on enlarger and, simultaneously, turn off the safelights near the enlarger. Thus image on the easel appears brighter to aid focusing and dodging. Second foot switch operates automatic timer. Port Authority electrician designed circuit.

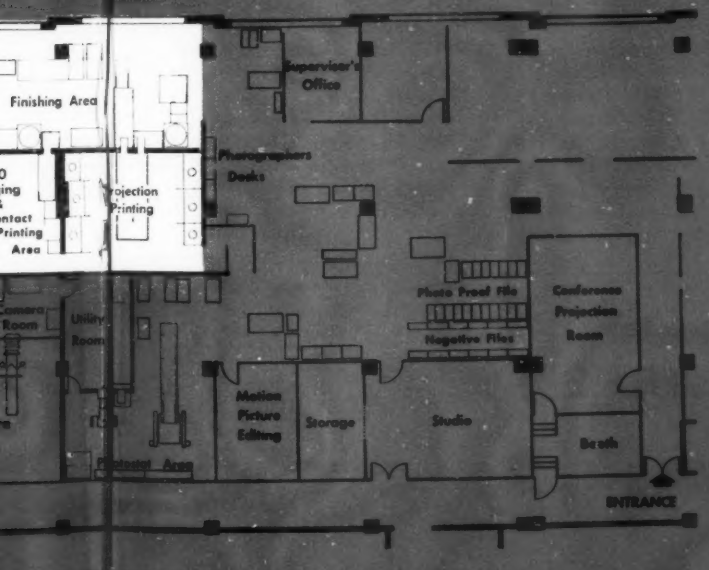
MASS PRODUCTION PHOTO LABORATORY

Occupying 5200 sq. ft. of floor space, lab of Port of New York Authority's Photographic Section is geared for efficiency. Procedures are streamlined so 22 workers can turn out 90,000 prints a year, as many as 3000 in one day's operation.



A KODAK AUTOFOCUS 5 X 7
B OMEGA D2 4 X 5
C ELWOOD CONDENSER 5 X 7
D PASS CHUTE
E UTILITY SINK
F HYPO BATH
G SHORTSTOP
H DEVELOPING
I 11 X 14 CONTACT PRINTER
J FAIRCHILD AERIAL PRINTER
K SALTZMAN 8 X 10 ENLARGER
L ELWOOD 8 X 10 ENLARGER
M MATTE DRUM DRYER
N LENZ WASHER
O PAKO ROCKER-TYPE WASHER
P GLOSSY DRUM DRYERS
Q COLLATING TABLE
R LAB CHIEF'S DESK
S RETOUCHING & OPAQUING DESK
T PRINT STRAIGHTNER
U AERIAL FILM DEVELOPING
V CUT FILM TANKS
W ROLL FILM DEEP TANK
X DRYCAB FOR FILMS
Y SINK
Z CABINETS FOR SUPPLIES





ORT AUTHORITY PHOTOGRAPHIC SECTION

PHOTO DEPARTMENT ANALYSIS *(continued)*

Provision has been made in the design of the laboratory to convert three small rooms into a complete color processing and printing unit, where they will be able to process color, make Dye Transfers, carbro, and Type-C prints and duplicate transparencies, when the volume and need for this work becomes great enough to make this economically practical.

Procedure

Standard procedure is used as much as possible throughout. All glossy projection prints are made on Varigam Rapid or Polycontrast Rapid. For exhibition prints, Cykora, Indiatone, Opal and Medalist papers are used—furnished in all available grades, with No. 2 used for most printing. The majority of solutions are prepared from packaged chemicals. For instance, hypo is used in 50 gal. size as is the hardener. Acetic acid is available in glacial and cut form. Formula D-76 is made from 10 gal. package and D-50 and D-19 in 3½ gal. Promicrol and PRA come in 1 gal. cans. The main paper developer used is Dektol in 25 gal. lots. Selectol is used in 1 gal. size. Bulk chemicals are used when making up toners and special formulas in small batches, such as a contrasty and soft paper developer. About 10 per cent of the exhibition prints are toned, usually sepia, with standard sulfide toner—bleaching and re-developing. Sometimes they use a Selenium toner or Nelson's Gold Toner. The special paper developers are used when the contrast of the paper tone is changed to some extent by modification of the developer. Any old-time worker in a photo lab uses the trick of increasing the metol and decreasing the hydroquinone and alkali to decrease the contrast and increasing the amount of hydroquinone and alkali to increase contrast. Agfa-120 formula is used for soft prints and Agfa-130 for contrast prints.

Much attention has been given to safety factors in the laboratory. The chemical mixing room is entirely separate from the darkrooms and has its own auxiliary ventilation system. This, says Mr. Handley, is so no one will be disturbed by hypo or toning fumes. Tongs and rubber gloves are available and all personnel use laboratory coats as their working uniform.

There are two film developing rooms plus an extra two which can be converted when needed. All photographers process their own work as soon as they come in from an assignment. The general system used is that of time and temperature (see chart). Inspection developing is only done when the photographer has encountered several difficult lighting conditions on his assignment. The method used by the photographer *(continued on page 56)*

YES

Art Thelin
General Petroleum Corp.

"We do all our processing, from transparencies to color prints. Speed was the first reason. We can shoot and have a finished-for-viewing transparency in less than four hours right here. Our own quality is at least equal to outside color lab processing.

"And now that we are shooting negative color extensively, we save the company at least 50 per cent of the costs of Type C prints.

"Our four-man unit shoots about 25 per cent of our work and I expect that figure to rise. One technician handles all the color processing—from 35mm transparencies to 16 x 20 Type C prints. He has temperature control and a carefully filtered water supply and a voltage controlled Beseler enlarger reserved for Type C prints.

"We purchase film of a single emulsion number in large quantities and store it in a refrigerator for consistency.

"We put color to all sorts of uses. Prints and large size transparencies for window display, color shots for technical fuel research reports—even our construction progress shots are all now made in color."

NO

Tom Masterson
Medical Center, U.C.L.A.

"We can utilize our personnel much better by sending our color out to be processed than by tying them up in our lab developing color film. With the amount of work we turn over to the commercial processor we get discounts in prices which compare favorably with what we could pay for the color transparency developing kits.

"I will admit it took some looking to find a color lab which gives us what we want in the way of quality. We work closely with them in matters of filtration and lighting control. They give us a daily pick-up and delivery service.

"We shoot an average of 800 color transparencies a month in sizes from 120 to 4 x 5 . . . photomicrography, clinical photography, macrophotographs of specimens and color records of research projects. We buy quantities of film of the same batch number and keep it under refrigeration until ready for use. We run tests with our color lab whenever we start a new emulsion number. Color fidelity is critical in this work and the quality of the lab's work is perfectly acceptable."

YES & NO

Ed Purrington
Ford Motor Company

"There are good reasons for processing color within an industrial organization, but there are times when it's not advisable. Some basic questions of economics and practicality should be answered before either course is settled on.

"In the first place, do you have sufficient space for color processing? We're inclined to think it should be a separate activity. For example, I don't think color chemicals should be used in the same sink with black-and-white chemicals; the problems of contamination are pretty serious.

"Do you have sufficient volume? Will you exhaust your chemicals or will you throw them away unused? Counting the costs of salaries, space, equipment and materials—can you do the work for less money than an outside processor?

"On the other hand, do you have recurring 'crash programs' which demand overtime and drive up the costs of an outside service?

"Here at Dearborn, we had our color film processed on the outside until we had enough work for one man full time."

PMI ASKS PHOTO CHIEFS . . .

SHOULD YOU INSTALL

YES

Raymond La Marca
Mytinger and Casselberry, Inc.

"The only time we employ commercial color processors is in the manufacture of the thousands of duplicate slides we produce yearly for visual aids. A commercial color lab can duplicate our 4 x 5's and supply us with quantity film-strips and mounted slides better than we.

"Aside from this, though, we handle color from exposure to finished print ourselves. Time is important with us. We can shoot and have the finished result ready for viewing in as short as half a day. With color negative film we can proof in color or black-and-white right away. And because we do a lot of food shots which depend on color rendering to look appetizing, we're very particular about quality. Color developers change as they are used, so we discard the chemicals well below exhaustion. By doing our own processing, we achieve control of all the variables.

"We also save money by processing color ourselves. Last year we processed from 200 to 300 sheets per month. We expect the savings to rise as our use of color in general and negative color in particular increases."

YES

Bob Shultz
Minneapolis-Honeywell

"As soon as I have the facilities, I'll go into color processing. I'm a one-man photo department in our Los Angeles Aero Division and the delay I encounter at times in sending work to an outside processor is brutal to our operation. It often happens that exposed color film contains vital data needed immediately by company officials. It hurts to have to sit and wait for pick-up and delivery as well as the time it takes to process the work. I hate to compete with amateurs for the color lab's time. To top it off, when a project is classified, I (or another person who is cleared for security) have to take the work to and from the lab. That's time which could be employed much more profitably.

"And no one has the interest in your sheet of film that you do. Outside labs do a good job, but I don't get the consistency I would like to see.

"At present about five to seven per cent of my work is in color, but that will increase as people accept and even demand color. I intend to go into the new, negative color films and Type C prints as soon as possible."

NO

Ralph G. Binder
University of Rhode Island

"Ours is a small department, consisting of myself and two student assistants. Although we fulfill roughly 4,000 picture requests a year, only a tenth of the work is in color. With some exceptions, we rely on outside processors. We do have some processing equipment and we do keep a supply of processing chemicals for our color sheet film work and for emergency rushes.

"But much of our color work consists of making 35mm transparencies for research work. This is done as the research goes on and we have little trouble delivering the transparencies by the time the research is finished. And we have no complaints about the quality of commercial processing.

"Currently we have no need for color prints, so they are not a factor for us.

"A university is a non-profit organization, and even small expenditures of time and money must be justifiable. Unless you're processing six or eight rolls a week, a small amount but more than we do, outside service is more economical than doing color processing yourself."

YOUR OWN COLOR LAB?

PORTFOLIO: NO. 3

PMI asked plant photographers and free lances: What's your most popular picture and why? Here are the somewhat surprising answers.

The goal of every photographer is to make a "best-selling" picture. No matter the size of his plant or the job, he knows that the ultimate test of his skill is the amount of use to which his final print will be put. PMI surveyed scores of plants, free lances, chambers of commerce, and what-have-you to find out what experience could teach. Naturally none of these places had kept an accurate scorecard as to exactly how many places a single shot had been used. However, they did know which picture had carried off the popularity prize. Herewith six pages and eight pictures, diverse in purpose, subject and technique, with some Monday-morning quarterbacking on why we think they have been so popular. One common denominator: each picture is technically superb.

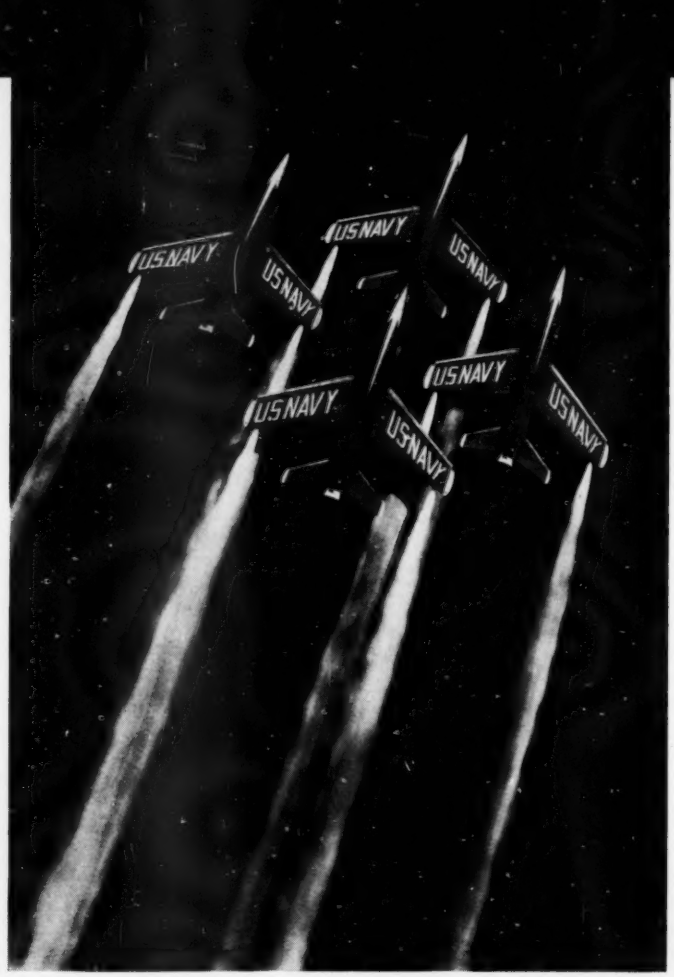
◄ HUMAN BEING: RARA AVIS

Ivan Massar's strong-faced Jones and Loughlin Steel Co. worker is an exception among "most used" pictures. This goggle-topped head of millwright George Polis was the only portrait which answered to PMI's survey. Outstanding, too, is the fact that the picture was not assigned in the usual way. A product of the days when J. & L. was concentrating on building [illegible] picture files, the shot was brought in by photographer Massar after he had been given a 2¼ x 2¼ camera and instructed to wander around the firm's Aliquippa Plant, shooting whatever interested him. This is one of several fine portraits he made then.

PICTORIAL SOCK: ALWAYS GOOD ►

This famous shot by Robert Yarnall Richie is a teaser. Its appeal lies not only in its pictorial magnificence (it's got that a-plenty—even an S-curve)—but in its paradox. Here is the vastness of the desert, gloomily horizoned by an approaching sandstorm, cut through by Arabian American Oil Co.'s ever-stretching pipeline. Far away—to emphasize his smallness—a lineal descendant of the nomads who once roamed these wastes. Now he is tied to one place by the pipeline. Truly a magnificent example of industrial photography and deserving of its many reproductions since it was taken over a decade ago, in the desert blaze of a 142° temperature.

PORTFOLIO
(continued)



JET AGE: CLOUD'S EYE VIEW ►

Once it was the Roman chariot, then a sailing ship; after that, a steam locomotive captured the imagination of boys of all ages. Today it is the jet airplane. And today's knights are the jet pilots. Among the best is the U. S. Navy's famed precision flying team, the Blue Angels. Here they are in tight formation, dynamically photographed in their Grummann FIIF-1 Tigers by Harry M. Burns, chief photographer of public relations for Grummann Aircraft Engineering Corp. Biggest problem for Burns was getting exact angle to show maneuvers. This shot was used as a cover on *Aviation Week* magazine and was printed by many newspapers and aviation magazines. Why? Because it is compelling, romantic and demonstrates astonishing technique both in flying and in photography.

◂ IN ONE LOOK: A YEAR'S FOOD SUPPLY

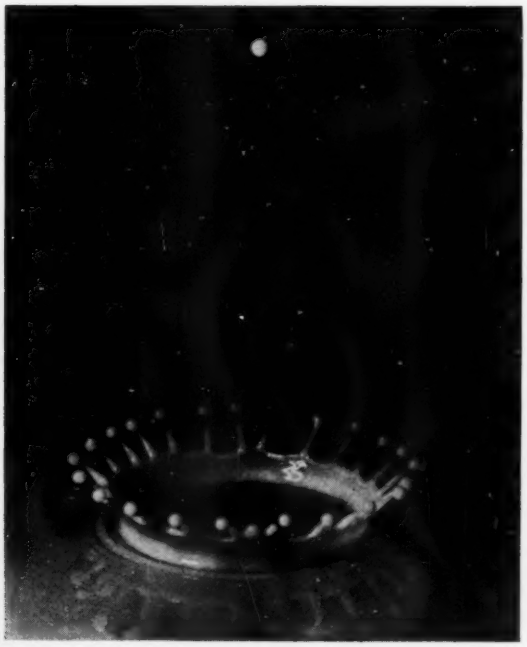
Translating statistics into graphic terms posed a problem to E. I. du Pont de Nemours staff photographer Alex G. Henderson. This shot, which first appeared in du Pont's employee magazine, *Better Living*, in 1951, demonstrates the American standard of living. Picture was picked up by *Life;* since then 600 prints of it have been used, by Dept. of State, Dept. of Agriculture, others. Why? Because visual appeal has more reality for the viewer than columns of figures. Making the setup took 20 hours in cold storage. Scheduling food delivery took almost that many days.

OIL & WATER: THEY DO MIX!

The Standard Oil (N. J.) Photo Library is rich in marvelous pictures of people, close-ups, beautiful scenes. But topping all other shots in popular appeal since it was taken in 1944 by John Vachon is this extraordinary view of the Tia Juana oil fields, in Lake Maracaibo, western Venezuela. These off-shore wells were among the first off-shore installations to be photographed. Vachon was in a speedboat when he took the picture. Picture editors probably couldn't believe what they were looking at when they first saw the scene. It isn't at all the popular notion of what an oil field should look like. And that fact goes a long way toward explaining the picture's wide use: it's different. The rare meeting of an alert photographer and an odd opportunity made it so.

FROM THE AIR: GIANT TO TOY TO COLOSSUS

How big is big? Well, it's all according to where you are. And if you are flying over the Rouge area, you may begin to get a concept of the might and scope of American industrial installations. R. S. Johnson, on assignment for the Ford Motor Co., Dearborn, Mich., had just that concept in mind: to show the vastness of industrial might concentrated in the Rouge area. His main problem: to center the Ford rotunda in the foreground and to find the proper light and weather conditions. He succeeded so admirably that this image of expanse has become Ford's most sought-after picture. And there is no mystery in its success. For here again is a word description, "industrial might," become reality through the use of camera and lens and the imagination behind them. ▼



BEYOND THE EYE: THE CAMERA

Professor Harold E. Edgerton, of the Massachusetts Institute of Technology, with his invention of a new light source, electronic flash, opened whole new worlds to photographer and viewer. Now the man with the camera can photograph the reality of speeds which the eye cannot stop. These two 20-year-old pictures have never lost their freshness. The answer to why they are used so often is not, we feel, just because they were among the first of their kind, nor that no one has since improved much upon them. We asked Harold Edgerton why he thought they were so popular, and he wrote: "Because people like them." We like the answer and think that this is the reason why all the pictures in this section have been used so often. Pictures may open new worlds of vision, they may simply touch that part of us that likes beauty, they may be stupendous technical feats, they may be simple portraits. But, above all, they must reach a difficult goal, they must be "well-liked". These classic photographs have reached that goal.

how to take pictures safely in

EXPLOSION-HAZARDOUS SITUATIONS

How can a photographer work safely in locations made hazardous by a possibly explosive atmosphere? How safe is his electrical equipment —flashbulbs, electronic flash, flood lights and electric motors on his movie cameras—all his electrical wiring switches and connectors?

These problems are complex mainly because of the great variety of explosion and combustion hazardous locations.

The National Electric Code Article 500 divides hazardous locations into three main classifications:

"Class 1 locations are those in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitible mixtures.

"Class 2 are those which are hazardous because of the presence of combustible dust.

"Class 3 are those which are hazardous because of the presence of easily ignitible fibers or flyings, but in which such fibers or flyings are not likely to be in suspension in air in quantities sufficient to produce ignitible mixtures."

The code further subdivides the Class 1 and Class 2 locations regarding specific explosive mixtures of gases, vapors and dust present, as follows:

Class 1

Group A: Atmospheres containing acetylene. *Group B:* Atmospheres containing hydrogen or gases or vapors of equivalent hazard such as manufactured gas. *Group C:* Atmospheres containing ethyl-ether vapors, ethylene, or cyclo-propane. *Group D:* Atmospheres containing gasoline, hexane, naphtha, benzine, butane, propane, alcohols, acetone, benzol, lacquer solvent vapors or natural gas.

Electrical equipment for use in hazardous locations, Class 2 as defined in the National Electrical Code, is tested with respect to safety of operation in the presence of combustible dusts in the air, as follows:

Class 2

Group E: Atmospheres containing dust of aluminum, magnesium or their commercial alloys. *Group F:* Atmospheres containing carbon black, coal or coke dust. *Group G:* Atmospheres containing flour, starch or grain dusts.

These groupings are classified in order of their danger qualities. Even these class groupings are divided into two divisions. Division 1 indicates locations where a hazardous mixture of gases and vapors exist in the atmosphere continuously under normal operating procedures or frequently because of repair or maintenance procedures. Division 2 describes locations in which flammable explosive mixtures are confined in closed containers or systems and can escape only in case of an accident or rupture. In other words, wherever there is a potential danger.

The National Electrical Code which was first drawn in 1897 is now sponsored by the National Fire Protection Association under the rules of the American Standards Association. The present code has very strict standards.

Underwriters Laboratory, Inc., sponsored by the National Board of Fire Underwriters, must test and give their seal of approval on any electrical equipment before it can be installed in a specific hazardous location. *(continued on page 64)*

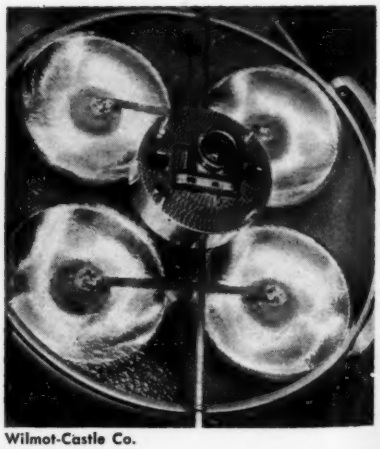
DESIGNED SPECIFICALLY TO KEEP PHOTOGRAPHERS ALIVE IN EXPLOSIVE SPOTS

Photo Lectronic Research

NO external wires, pneumatic trigger, increase safety of electronic flash.

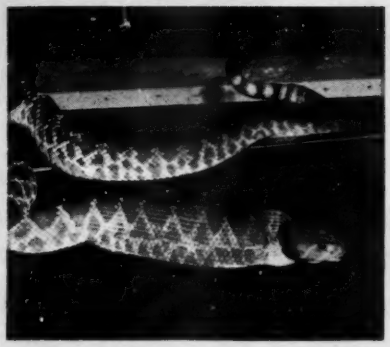
U. S. Bureau of Mines

SLAVE FLASH unit has low-power trigger circuit for safety in mines.



Wilmot-Castle Co.

OPERATING room light has built-in 35mm camera, is safe 5 ft. above floor.



RATTLESNAKE is held in position atop X-ray film holder as he is in process of swallowing a hamster wider than itself.

CHALLENGING ASSIGNMENT:

Problem: to show graphically why a snake is able to swallow a body larger than its own. Solution: the X-ray photograph shown below. Photographer: Robert Logan of the American Museum of Natural History, New York, New York.

Scientists have long known the reason why a snake is able to encompass a body larger than its own. The reason: a snake's jaws are hinged with cartilage which permits a wider angle of "bite" than a human's.

However, knowing this fact and graphically demonstrating it are two different kettles of fish (or snakes, as is the case here). The American Museum of Natural History in New York called in staff photographer Robert Logan. Working with the Museum's Department of Herpetology (amphibians and reptiles), he found a solution.

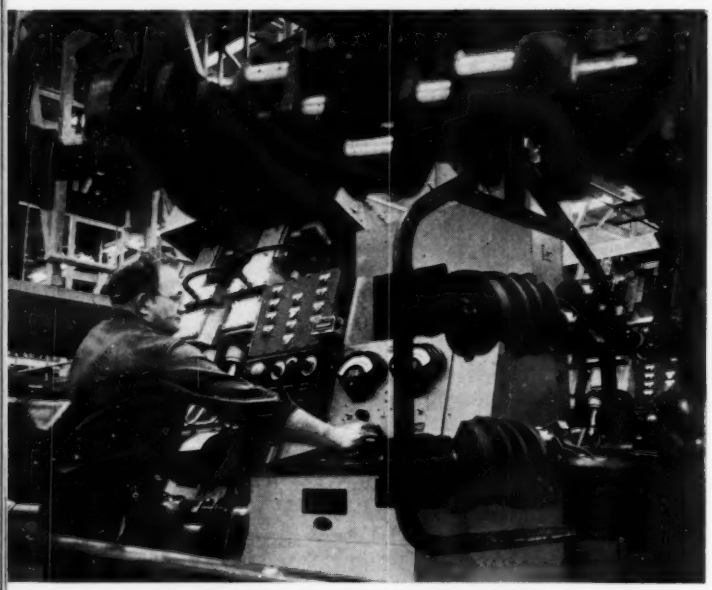
First the rattlesnake killed the hamster. Then the snake was placed in position atop an 11 x 14 film holder which contained a sheet of Kodak Par Speed Blue Brand Screen X-ray film. Thirty-six inches above the subject was a Picker X-ray tube, in a Wappler experimental X-ray unit.

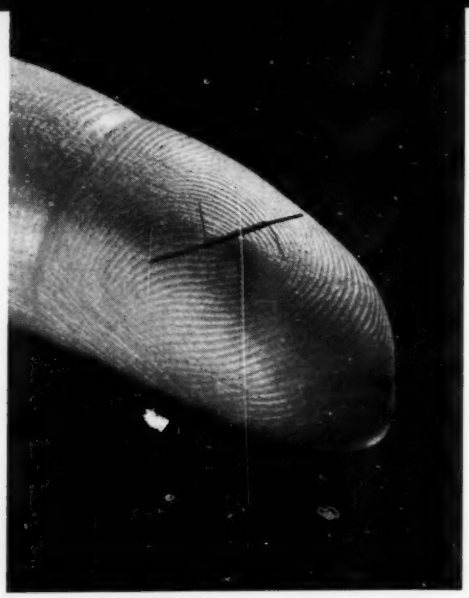
Exposure was for ¼ second with a 20 millilamp current. The machine was operated at 47 kilovolts.

The Wappler unit, by the way, was originally developed by Westinghouse for its own experimental purposes, then acquired by the Museum. It has more control in kilovoltage than the standard medical X-ray unit. The Museum needs this control since low kilovoltage increases contrast, while high kilovoltage increases penetration. The large variety of subjects that the Museum X-rays necessitates such flexibility.

X-RAY photograph taken by Robert Logan with setup shown above demonstrates why rattlesnake's jaws open differently from the way a human's do. ▶

R. S. Johnson, Ford Motor Company, Dearborn, Mich., used the familiar device of showing man, machine and product to produce an arresting picture of a crankshaft balancer which tells the entire story at one glance. He used a Pacemaker Graphic on a tripod and existing light. Exposure was 1/5 sec. with a 127mm Ektar lens at f/16. Royal Pan.





CHARLES HANSON, Arthur D. Little, Inc., Cambridge, Mass., drew the assignment of showing the size of a Cryotron, an electronic computer switch made of .003 and .009-in. wires. A devil to illuminate, the Cryotron looked disappointing with coins or matchheads. A typist's finger finally provided the solution, *above*. Hanson used a 9 x 12cm Voigtlander extended fully, 135mm lens at f/22, close-up lens, electronic flash, Super Panchro-Press Type B.

Martin J. Dain, New York, N. Y., while making pictures of the construction of the third tube of the Lincoln Tunnel under the Hudson river, saw rhythm and excitement in the pattern of lights snaking into the recesses of the tunnel. He capitalized on this insight by combining the lights and two engineers in his Leica viewfinder. The men were lighted by dim sunshine penetrating into the mouth of the tunnel. Dain used a wide-angle Zeiss Biogon lens, shot at 1/50 sec., f/2.8 on Ilford HP3 film developed 10 min. in Promicrol.

PMI's Monthly

READERS' SHOWCASE

Five of PMI's readers supply pictorial solutions to industrial photo problems.

Simplicity does wonders for a photograph. But simplicity itself can be dull as gruel unless the photographer spices his work sufficiently to lure the onlooker's eye.

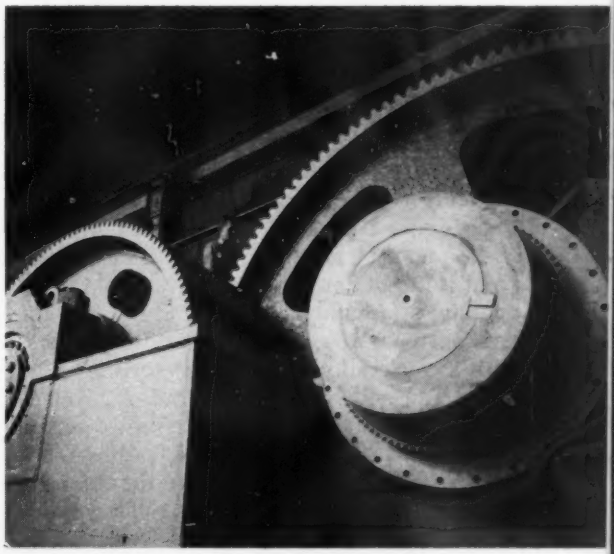
And that brings up a point. How contrived can your pictures be before they get lost in their own complications? When does straightforwardness and simplicity fizzle into blandness?

Five of PMI's readers, represented on these pages, let their good taste dictate the right portion of complexity. Charles Hanson used simplicity in shape and tone to make his picture bold—then rendered the detail with heartening richness. Martin J. Dain got another kind of richness by playing the abstract against the documentary. R. S. Johnson used complexity to show the complexity of a job and a machine, whereas Arthur L. Schoeni was struck by the smooth non-complex lines of quite another machine. And Jack Engel carefully planted a figure in his massive scene to give it an exciting dash of the unexpected.

You are invited to send in your pictures for this feature. Here are the details:

There are two rewards for each of the pictures chosen. The first is knowing that your picture will be seen by appreciative fellow professionals. The second is $10.00. Please include your name and your company's name, a note about the picture and how it was used, and the technical data. Send them to SHOWCASE, PMI, 33 W. 60, New York 23, N. Y.

ARTHUR L. SCHOENI, Chance Vought Aircraft, Dallas, Texas, when asked to provide "something different" to illustrate the F7U Cutlass Navy jet fighter and its pilot, simply walked behind the tailpipes of the plane, composed this surrealistic design on the ground glass of his Rolleiflex and shot at 1/100 sec., f/11, through a K2 filter on Superpan Press film.



JACK ENGEL, United Engineering and Foundry Co., Pittsburgh, Pa., was asked to supply a publicity photograph of an enormous double gear reduction drive. He angled his 8 x 10 Calumet into place and focused his 165mm Schneider Angulon lens. By allowing the verticals to converge, he emphasized the massive looks of the gears. But something was missing. A man placed subtly but conspicuously where the gear teeth met lifted the picture out of the ordinary. Royal Pan, f/11, 1 sec.

Lloyd E. Varden

The editors of PMI asked me to devote my contribution this month to the sensitometric curve, particularly its applications in darkroom practice. I should have thought that this subject had been adequately covered in the past, but a few inquiries proved that this was not a good assumption. Much of the valuable information provided by the manufacturers goes unused for want of technique in evaluating it. Here are my answers to PMI's questions about . . .

THE GRAPHS NO ONE KNOWS HOW TO READ

1 What can the sensitometric curves tell me about the difference in contrast between two films?

Let's assume that a total luminance range (the range from the darkest part of the subject to the brightest part of the subject) of 1 to 100 is frequently encountered and that we do not want a minimum density of over 0.2 in our final negatives (roughly an average for the thinnest detailed part of most negatives). Now let's compare the overall contrast characteristics of Kodak Royal Pan and Kodak Super-XX. A given degree of development must also be assumed when comparing two films. From the published charts *(opposite)* the closest curves are those for gammas of 0.92 for Kodak Royal Pan Film and 0.90 for Kodak Super-XX Panchromatic Sheet Film.

By drawing a line parallel to the base line at the 0.2 density level we can use its point of intersection with the curve for a gamma of 0.92 as the starting point for the luminance range. A vertical line dropped from this point falls at 3.00 on the exposure axis. Each full log unit represents a 10X increase in exposure. Therefore, the distance on the graph from $\bar{3}.00$ to $\bar{1}.00$ represents a luminance range of 1 to 100. The vertical line drawn at $\bar{1}.00$ intersects the gamma 0.92 curve at a density of 1.6. Therefore, on the basis of the assumptions, Royal Pan produces a density range $\triangle D$) of 1.4 (1.6 minus 0.2). I am ignoring here the effects of camera flare.

The same construction has been made for Super-XX. Assuming the gamma equals 0.90 to be pretty close to gamma equals 0.92, this film produces a density range of 1.6 for a luminance range of 1 to 100. Thus, even at a somewhat lower gamma, the contrast of this film is higher than Royal Pan for subjects of wide luminance range.

2 How can I compare the tolerance for pushing development, that is, the maximum usable speeds of two films?

The extent to which a film can be "pushed" in development to obtain maximum speed is determined by the rate at which fog increases relative to the rate at which toe gradient increases. You can see from the curves for Portrait Panchromatic film (*page 51*) that extending the development from 5½ min. to 20 min. does not cause a steepening of the toe gradient nearly as much as in the case of Royal Pan when development varies from 3 min. to 18 min. The fog level is slightly

HOW MUCH DO THESE SENSITOMETRIC CURVES MEAN TO YOU?

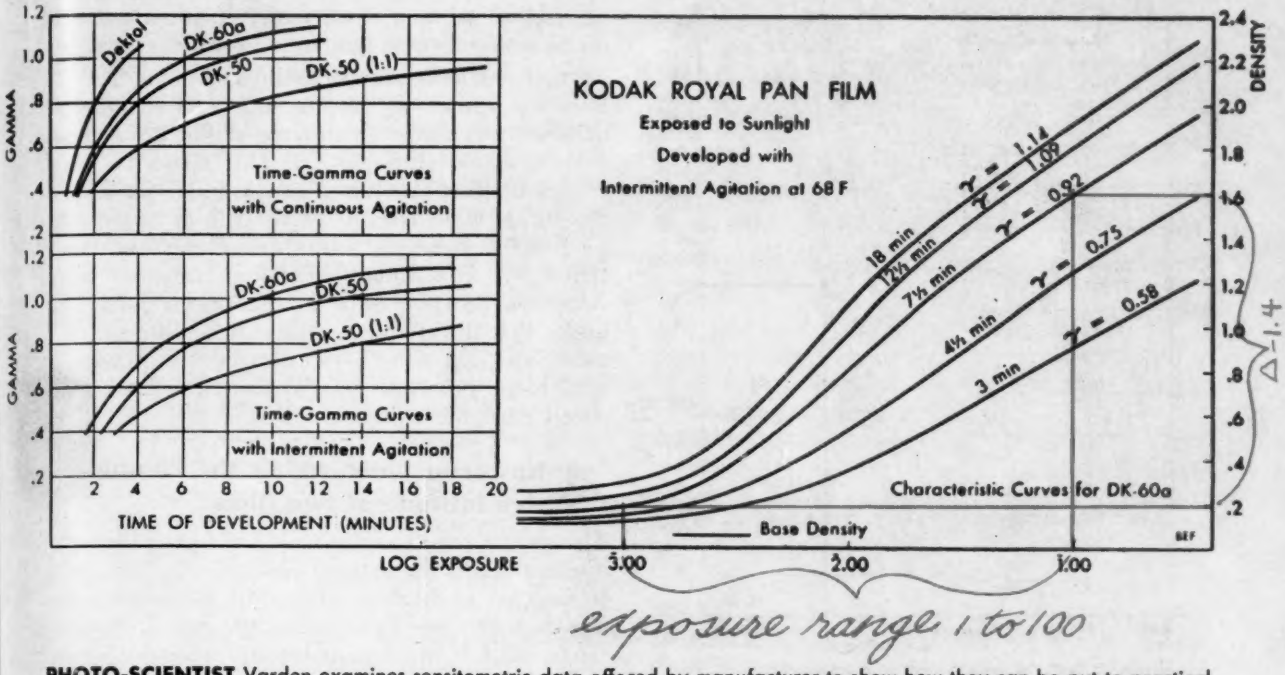
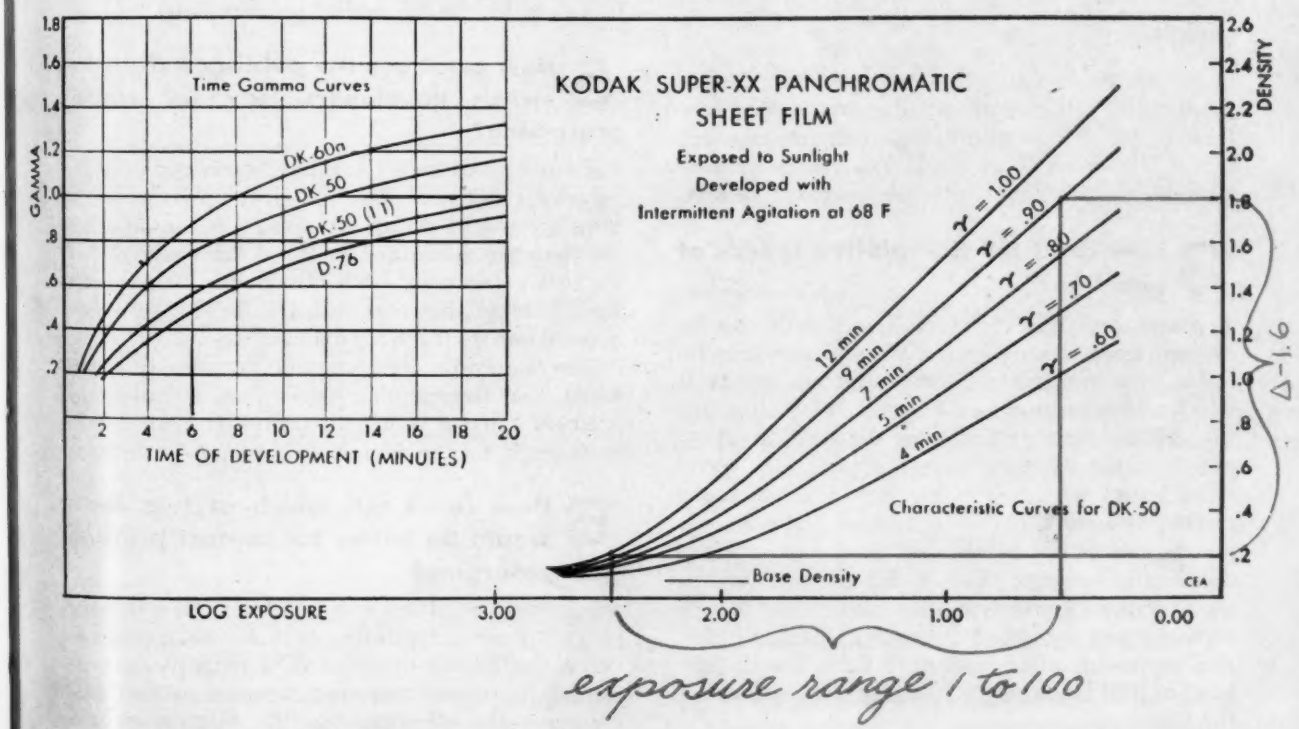
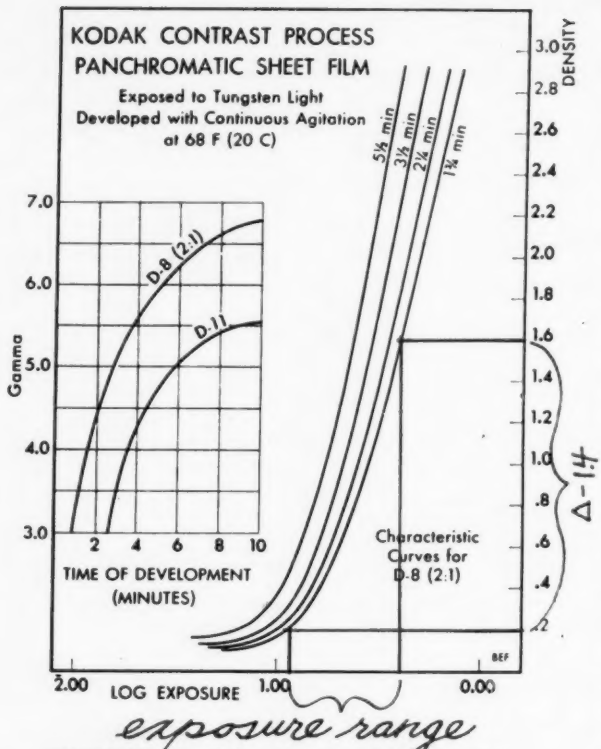


PHOTO-SCIENTIST Varden examines sensitometric data offered by manufacturer to show how they can be put to practical use. By means of his analysis, discussed step by step in text, he shows that photographs of high contrast subjects are likely to be rendered flatter on Royal Pan, *above*, than on Super-XX, *below*, and that the speed of Royal Pan compared with the speed of Super-XX is higher than the ratings indicate. Charts on this page and on pages 50 and 51 reproduced with permission from the copyrighted *Kodak Film for Black-and-White Photography*.





EXTREME case of short exposure latitude is Contrast Process Panchromatic—designed to give contrasty results from short luminance ranges.

GRAPHS *(continued)*

higher for Royal Pan when it is "pushed" in comparison to Portrait Pan, but the gradient or contrast in the low exposure region increases *much* more. This means that Royal Pan can be pushed more in the development with practical benefit.

3 How can I tell the relative speeds of two films?

A practical evaluation of relative speeds can be derived from sensitometric curves in approximate fashion by comparing the exposure-axis points at which the film produces a density of 0.10 above fog. When vertical lines are dropped at these points to the exposure axis, a *doubling* of speed is indicated whenever a log exposure difference of 0.30 is found. In the published data the exposure axis is not subdivided to the extent that the density (vertical) axis is. But the subdivisions on the density axis can be transcribed to the exposure axis for speed evaluation. Each subdivision represents a $\log_{10}$ spread of 0.20. The density level of 0.20 is roughly 0.10 above the fog level of the film.

I have done this on the graph of Super-XX film (*page 49*) as an example. Thus, the $\log_{10}$ E point corresponding to a density of 0.20 for a gamma of .92 is slightly over 0.5 (in terms of logs) farther along the exposure axis than the $\overline{3}.00$ point. Therefore, the spread of 0.5-plus log units represents over a three times greater speed for Royal Pan in comparison to Super-XX. This seems to contradict the fact that the exposure index for Royal Pan (E.I. 200) is only twice that of Super-XX (E.I. 100). However, exposure indexes are computed by a different criterion. Anyone who compares the two films in practice is likely to notice that Royal Pan is more than one stop faster than Super-XX. The .10 density above fog method is a more practical general description of film speed than the exposure index.

4 How can I determine the comparative latitude of two films?

The shorter the exposure scale for a given density range, the less the exposure latitude. Take an extreme case to illustrate the point, the curves for Contrast Process Pan *(page 50)*. For a density range of 1.4 the $\log_{10}$ Exposure range is very short. Only about ⅕ that required by Royal Pan for a density range of 1.4. After all, films have limited density ranges, and so if a density range of 1.4 (fairly high contrast) is obtained with a film when it is exposed to a luminance range of only 1 to 10, the latitude of the film must be low.

5 How can I use the published data to switch developers, say for rapid processing?

For rapid processing, the time-gamma curves published for different film and developer combinations are useful. As an example, you can refer to the time-gamma curves for Royal Pan *(page 49)* to see that a gamma of 0.8 is obtained in 2 min. with Kodak Dektol, whereas with DK-50 (1:1) it takes about 9 min. to reach a gamma of 0.8.

The maximum development latitude is given when the time-gamma curve has a minimum gradient (that is, when the curve is most nearly horizontal) for the degree of development desired.

6 How can I tell which of two films would be better for contact printing —for enlarging?

In general, negatives can be of a higher density range for contact printing than for enlarging because the diffuse densities of a negative are effective in contact printing, whereas with many enlargers the effective densities fall somewhere

between the diffuse densities and the specular densities. This is particularly true for condenser enlargers. Specular densities are always higher than diffuse densities and are progressively higher as the density level becomes greater.

The *greater* the amount of light transmitted for a given incident light quantity, the *lower* the density. But in photographic practice we have to consider how much of the transmitted light is actually received by the material being exposed. If some light that gets through is lost and never reaches the printing material it is equivalent to the film having a higher density.

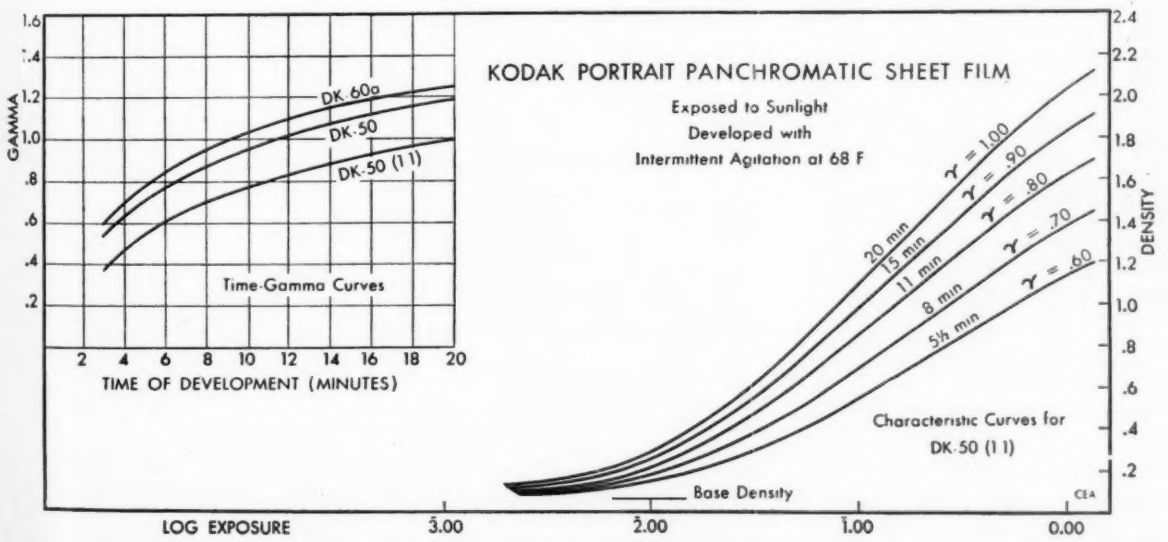
In contact printing, where the printing material is pressed against the negative, all of the light transmitted by the silver deposit is received by the printing material. It can't escape! But if the device which receives the transmitted light is specially separated from the negative there is a good chance that some of the light scattered by the silver deposit will come through at too wide an angle to be within the acceptance angle of the receiver—photocell or printing material. Thus, the effective printing light is reduced as though the negative density were higher.

The extent of this effect depends, among other factors, upon 1) the nature of the illumination incident upon the negative, i.e., whether it is in itself a diffuse light or more or less collimated (parallel). 2) the amount of silver the light must traverse, i.e., the general density level. A clear piece of film base causes practically no light scatter, for example, but as more and more scattering particles of silver are present, the greater the amount of scatter.

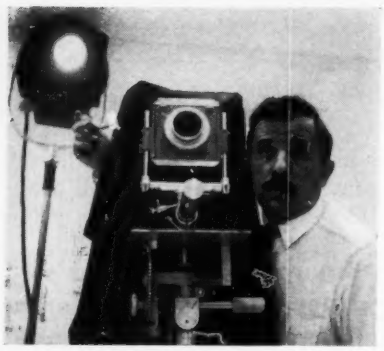
Contact printers almost invariably have diffuse illuminations systems. But enlargers vary all over the lot. Roughly, the exposure and development

7 How can I figure out the proper exposure and development time for a new film to duplicate the results I have been getting with my present methods?

times could be derived on the basis of the discussion already given pertaining to the practical interpretation and applications of published D-Log E curves. But considering manufacturing variations of films, variations due to storage, unreliable relationships between published data and results obtained under practical conditions, etc., it is useless to expect more than guideposts for practical work from preliminary calculations. One cannot consider published sensitometric curves as something *absolute*. They usually show the general properties of the product at the time of manufacture, but in some instances they may reflect changes which occur during the first few months after manufacture. There is nearly always a lag period between the making of a film and the use of it in practice. If a manufacturer knows that a particular product changes in speed, contrast, etc. through a short period and then becomes rather stable in its properties for the rest of its normal life span, the data published for that product will be characteristic of its stabilized properties.



SHAPE of characteristic curves and time-gamma curves for Portrait Panchromatic Sheet Film shows that it offers wide development latitude. As text explains, however, it responds little to efforts to "push" development to increase speed.



Morris Gordon and Friend

IN-PLANT TEST

He's used about every view camera you can name, and some you can't. Here's what Gordon thinks of the Swiss Sinar.

SPECIFICATIONS: Sinar Expert View Camera. Interchangeable backs and bellows or adapters permit rapid change to 8 formats. Polaroid back available late this year. Micro-gear operated fine and coarse focusing. Unlimited rise and drop. 90° tilt, 3" left and right shifts, 30° side swings, full camera swivel around optical bench axis. Graduations with click-stop centermarks, fully visible levels. Each adjustment has positive lock; fingertip operated and interchangeable for right- or left-hand operation.

Collapsible wide-angle bellows and flat frames accommodate extreme wide-angle lenses. Wide-angle bellows, with magnifier, doubles as focusing hood. Unlimited extension of bellows and optical bench permit extreme telephoto lenses. Auxiliary frame or interchangeable backs usable for macrophotography, copying, photomontage, and trick processes. One microscopic adapter attaches Sinar to any microscope for photomicrography.

Sinar synchronized shutter usable with almost all lenses, automatically closes as holder is inserted. BC flash insert for up to 20 extensions fits into optical bench tube. Registration pins, stabilizing rods, and Multicolor film holder convert Sinar 8 x 10 into reproduction camera for color separation. Lightweight: 4 x 5, 7 lbs., 5 x 7, 9 lbs., 8 x 10, 11 lbs.

Morris Gordon, Assistant Superintendent in Charge of Photographic Services, Western Electric Co., reports: We have two Sinars and use them for all our large camera work. We've found them more satisfactory all round than any other view camera. With a complete set of backs we can shoot black-and-white in 4 x 5, color portraits and small color stuff in 5 x 7, and national color ads in 8 x 10.

The camera has a lot of good points that all add up to convenience. First of all, it's the lightest full-size view camera I've ever worked with; an 8 x 10 you can set up and use on a small-camera tripod. This is a big feature in itself, but since our men are forever flying all over the country, weight often means money to our office. Though the initial cost of a Sinar is high, as I see it we've made their price back by paying lower excess baggage charges to the airlines.

I also like the fact that all the controls on the Sinar are fingertip operated. Some of the other view cameras are so sluggish they wear you out.

The wide angle bellows is another feature that makes the Sinar a pleasure to work with; there's no vignetting or cut-off at the corners. What's more, the idea of using the wide angle bellows instead of a focusing cloth is an inspiration. It clips on very easily, right in back of the ground glass, and the magnifier fits into the spot for the lens board. A very neat arrangement. Anyone who has ever tried to handle a big camera and a square yard of dry goods outdoors on a windy day will appreciate it.

The Sinar, by the way, is ideal for using the Schneider Super Angulon. It is so compact that we get coverage of a 5 x 7 film with the 90mm Super Angulon. And you don't need one of those trick mountings that sometimes cost pretty near as much as the lens itself!

There are just a few things about the Sinar I wouldn't mind seeing changed. First of all, it's too bad the Sinar won't accept a standard lens board. Our work is so diverse that we're constantly called upon to be changing lenses. Instead of getting all our lenses remounted, we've had a camera mechanic re-tailor a Sinar lens board so that lenses mounted for other cameras will fit into it, board and all. What he did was to cut the middle out of a Sinar lens board, set a 4 x 4 aluminum frame around three sides of it, and put a Graflock on top. It works fine, and it certainly saves us a lot of time switching lenses around.

Another feature that puzzles me is the fact that the 4 x 5 back is made just too narrow to accommodate an American filmpack adapter. They must have narrower adapters in Switzerland.

People I've spoken to who use the Sinar have complained that the front board doesn't swing on the lens axis. This doesn't bother me since all it means is that it takes a few seconds longer lining up. If anyone does find it a nuisance, all he has to do is use the extension bellows, which is easy to hook up. The front board on that has all axis movements.

There's one feature of the Sinar that's seldom mentioned, but I think it's pretty important. The Sinar is beautifully made. Most of the people who come into my studio are engineers, and practically every one stops to admire it as a magnificent piece of craftsmanship.

This is not to say that the Sinar is a flashy piece of apparatus. It isn't. There's nothing on it that's just for show. It looks just like what it is: a highly-developed piece of equipment for the serious professional. That's saying a lot.

by Bernard Hoffman

QUESTION & ANSWER

QUESTION: In our medical work we are attempting to transfer some of our old 35mm slides into a movie using a 16mm camera. How can we accomplish this?

—W. L. Cooper, M.D., Lexington, Ky.

ANSWER: Probably the best way of doing this is to enlarge your 35mm slides to 4 x 5 or larger transparencies. (Most custom color laboratories can do this for you if you don't wish to do it yourself.) Then illuminate your enlarged transparencies with diffused light from the rear and shoot them directly with a focusing lens on a 16mm motion picture camera on a titler. This method not only enables you to shoot at convenient working distances, but allows you to move in close and photograph small sections of the original scene to emphasize important details.

QUESTION: Why do you speak of 35mm film and cameras if the film really is 24 x 36mm?

—Gaston G. Krishman, Chicago, Ill.

ANSWER: While the *frame* size of most 35mm cameras is about 24.5 x 36.3mm, the width is 35mm. ASA dimensions give the width of negative raw stock as 34.98mm plus or minus .03mm, leaving about 5mm on both sides of the picture area for sprocket perforations.

QUESTION: Other than making a special negative or scraping the emulsion off with a razor blade, is there any way of preparing the borders of a glossy print so that I can write data on them?

—Ernest Miller, Sherman, Texas

ANSWER: You can type on glossed photographic paper or write on it with grease pencils, crayons, drawing inks or India ink. Trouble is that these markings rub off with varying degrees of ease. Some inks, such as Higgins Eternal Ink, leave a vestige even when most of the marking is gone. The only convenient way of making permanent markings on the front of a glossed print that I know of is to write in India ink on a "thin" part of the negative (on the shiny side, of course, so it reads left to right) before printing.

QUESTION: I would like to shoot several different shots of either people or objects in action. I believe what I have in mind is called a stroboscopic effect. What is the procedure for getting eight exposures on one film? If I wanted to take a shot of a tire blowing out, showing several stages in one shot, would this take special equipment?

—Curt Giese, Milwaukee, Wis.

ANSWER: Stroboscopic effects can be obtained in three ways. The use of a single unit firing several times in rapid succession is not very practical. The very few outfits capable of this type of operation are bulky, heavy and expensive. Since they are required to charge and fire in a fraction of a second, moreover, their light output is fairly low.

Stroboscopic effects can be made with a single unit by making a series of exposures on a single film. If you plan your action carefully, and shoot in a darkened room against a black background, you can make excellent multiple exposure pictures.

If it is necessary to record the action as it occurs, you could use a separate electronic flash unit for each step you wish to record. Shooting open flash, you can set off the units in succession from a simple rotary switch (available at most electronic supply dealers, who can show you how to connect the triggering wires to the contacts of the switch). Before shooting, it's a good idea to try several dry runs, to get your timing down pat.

The shot of a tire blowing out would require an automatic setup activated either by sound or by the force of the blowout itself. But a blowout is an almost instantaneous thing and multiple electronic flash, in quick enough sequence to record the event, might show such an overlap of images as to be meaningless.

High speed cinematography is a better choice of medium for this subject.

QUESTION: Occasionally I have had a print that required reducing in a small area or spot. Figuring that ferricyanide would do the trick, I have proceeded to use that chemical with a brush or cotton tip. All too frequently, however, the worked on area has retained a brown yellow stain. Can the stain be avoided?

—Lee Drucker, Oyster Bay Cove, N. Y.

ANSWER: To prevent staining, mix your potassium ferricyanide solution with hypo (three ounces of sodium thiosulfate in a pint of water) immediately before use. You'll then be using non-staining Farmer's reducer, which is available in inexpensive packets complete with directions in most photographic stores.

QUESTION: Using a miniature enlarger and a No. 1 photoflood, I've been able to make satisfactory black-and-white negatives from 35mm color slides. Can I use the same method to make Ektacolor Type S sheet film negatives for Type C prints, without a filter?

—James F. Kemp, Danbury, Iowa

ANSWER: Filtration is the least of the problems. Harder to resolve is the difficulty of contrast. You have probably been overexposing and underdeveloping your black-and-white negatives to compensate for the high contrast of the transparency. You can't apply the same solution to Ektacolor films. Although it's possible to use a contrast control mask on your transparency or a contrast-lowering flash exposure, it's easier to take your 35mm transparency to a photo dealer for a Kodacolor negative (actually made on a special low contrast internegative film). The cost is 30 cents and you won't have to worry about contrast or the color temperature of the lamp shifting as it ages.

What's your technical problem? Ask Bernie Hoffman. It's simple, just write: Questions Editor, PMI, 33 W. 60, New York 23, N. Y.

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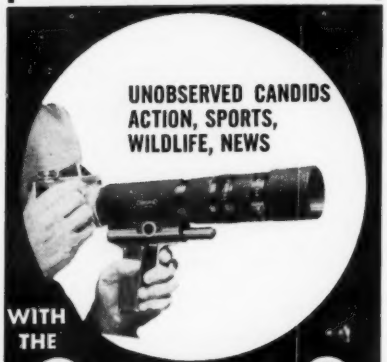

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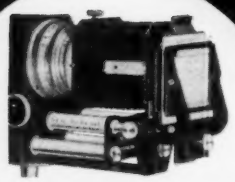

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POCKET-SIZED LAB

(continued from page 27)

all overhaul manuals are produced, require a negative size of exactly 8½" x 11". These are laid out two-up and shot on a 12" x 18" film. Outside and top are already in register, and an aluminum template laid down between the sheets of copy to ensure correct space for the separating cuts. The job could have been done using pin register and having special 8½" x 11" film cut. It is always a great feather in a technician's cap to solve a problem using the materials on hand instead of having others made. The latter is sometimes unavoidable, though. In this case it was found to be much more convenient to use a standard film size and eliminate all the worries that would inevitably flow from the extra operations involved in getting a special supply of an odd size.

Fred Schroeder, Jr., and George W. Rodgers received a suggestion award for setting up the template system and following through with the idea of trimming the negatives to size with three cuts of the power trimmer. Previously, trimming 100 negatives by hand required six hours. With uniform negatives assured by the template, almost any number can be sized exactly in just as long as it takes to operate the power cutter—a matter of a few moments. Two hundred at a clip is the largest number that has been processed so far, but there is no reason why twice or three times as many negatives as that can't be done should the job require it.

Better results

Aside from the saving in time and money—on 2000 negatives processed last month the man hours saved added up to 120—negatives collect less scratches and other damage than when trimmed by hand with a razor blade.

Most important in setting up a graphic arts department, says Mr. Martin, is the calibre of the staff. The work is highly specialized, and for efficient operation should be handled only by men of considerable experience in the graphic arts field.

Technical help

Excellent technical advice and assistance in setting up a graphic arts department, says Mr. Martin, is available from the manufacturers of reproduction equipment, who also put out several publications which are invaluable to the man who must keep up with the latest processes, materials, and techniques in the fast-moving graphic arts field. THE END

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DARKROOM SINKS

(continued from page 28)

oddball or the mad genius who can turn out professional-grade work using only the three little trays and 49¢ safelight with which most of us started in photography.

At the heart of every darkroom operation is water. Anyone who has ever had a batch of irreplaceable negatives ruined by impurities in the water won't need to be told why the Indians were particularly diabolical in devising tortures for anyone caught poisoning a well.

Yet the wrong sink can do as much damage to lab efficiency as arsenic in the old oaken bucket. There's no need to risk disaster: any of the manufacturers listed in PMI's guide to darkroom sinks can—and will, gladly—help you find exactly the sink that's indicated for the kind of work you do. In fact they will design your darkroom for you. Trained engineers will diagnose your processing problems and write you an equipment prescription—all at no cost.

Sales gimmick? Sure it is! So what? There's more to darkroom planning than just painting over the windows. The old wooden sinks the neighborhood carpenter installed half-a-century ago were good enough for their day—and they certainly were cheap enough. If you're doing a snappy line of *carte-de-visite* portraits, or coating your own plates with collodion and all that goes with it—the antique wooden sink is all right for you. If you're doing anything the least bit more up-to-date, though, you should give some thought to your equipment. Are you getting the maximum of service from your sink? Does your sink require more man-hours in just keeping it clean and watertight than it's worth? Briefly—are you wasting too much time looking after a piece of darkroom apparatus that should be all but taken for granted? If your sink is battered, outmoded, or just plain old, you probably are. It will be worth money to you in the long run to get some expert advice from any of the firms listed in PMI's darkroom sink chart. For remember, it's a horrible feeling to know that just because your sink wasn't up to today's requirements, an important job went down the drain!

The art of fitting the right sink to the right job is such an involved one that PMI won't even attempt it in the space of one short magazine article. What we will do, though, is use all the powers of persuasion at our command to urge anyone contemplating darkroom revision to get in touch with the design staffs of the manufacturers. It costs nothing, and saves money and worry in the end. All you have to know is your problem—these men know the answers!

And don't build first and ask advice afterward. It's always less trouble—and cheaper—to know what you're going to do before you do it. With a little intelligent foresight you won't be stuck with the costly problem of getting a big piece of equipment through a small door, or the disagreeable job of knocking out a freshly-plastered wall to do the plumbing or electrical fitting that should have been done first.

Moreover, it's too much to ask of an ordinary businessman that he understand the complicated engineering problems involved in setting up a darkroom. And make no mistake, it is engineering. So leave the expert's job to the expert.

For additional information on darkroom equipment and planning, just circle 265 on the Readers Service Card, page 59. PMI will forward your name to the manufacturer.

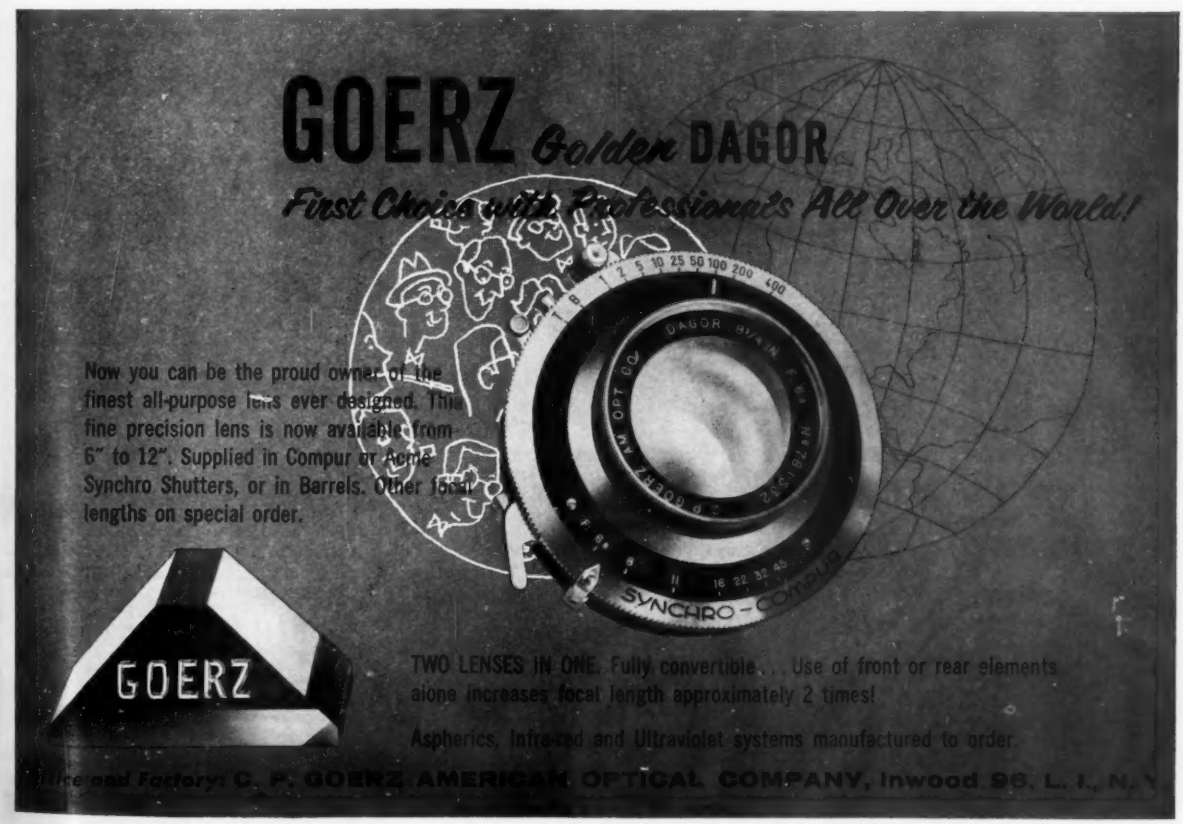
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PHOTO DEPARTMENT ANALYSIS

(continued from page 35)

is this—he puts all the film in the developer, and one minute before developing time is up he inspects one film under the green light. If it is the density he wants, he then puts it into Flashograph rapid fixing solution and in 15 seconds he can inspect under the white light. If it is good, he still has time to get all the films out before the developing time is up.

There are 3½ gal. light tight tanks for cut film and 6 gal. stainless steel deep tanks for roll film. The Aero Graphic XX film is developed in regulation aerial developing tanks and dried in an aerial drum film dryer. Films are put in Kodak Photo Flow before being placed in the Pako Drycab.

The bulk of processing is 4 x 5—Royal Pan, Super Panchro-Press Type B and Royal-X Pan. For 35mm work they use Plux-X, Tri-X and for 120 size, Verichrome Pan, Tri-X and Panatomic X (see chart).

There are seven enlargers in the projection print room—three 4 x 5 Omega D2's, one 35mm Omega, a 5 x 7 Elwood condenser enlarger and two 5 x 7 Eastman Autofocus diffusion enlargers. Each unit of three enlargers has its own developing and fixing trays, which are in stainless steel sinks.

A typical enlarging cubicle is 56-in. wide. Each unit is equipped with a foot switch which activates the enlarger and at the same time turns off the safelight to make composing and focusing on the easel easier. A second foot switch turns on the timer which is preset for the required exposure and turns off the safelights during exposure. Thus, the technician can have both hands free for dodging or vignetting. Any qualified electrician is able to work out the wiring for the switch and make the necessary modifications in the circuits—the details are too intricate to include here. Each operator has his own drawer space, under the enlarger, where he keeps his tools, such as dodging devices and other accessories.

One interesting innovation is a special enlarging bench made for the 5 x 7 condenser enlarger. In making extra large prints, an adjustable

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easel can be elevated or lowered by means of tracks which permit the easel to be adjusted to varying heights, from floor level to 36-in. The tracks are 8-in. apart. As everyone knows, an 8 x 10 condenser enlarger is very expensive, so when extra large prints must be made, this is how Mr. Handley solved the problem, without buying this equipment. When it is known in advance that such enlargements will be needed the photographers, in such cases, switch from the 9 x 9 aerial camera to 5 x 7, f/8 or K-20 (4 x 5) aerial camera. With this specially designed bench and 5 x 7 condenser enlarger, they are able to make 20 x 24 prints from part of a negative.

Next to the projection printing area, there is another room designed mainly for contact printing with two semi-automatic 11 x 14 contact printers. One side of this room, however, is allotted to two 8 x 10 diffusion enlargers—one Saltzman and one Elwood. The Elwood enlarger is on a table with castors so it can be easily moved about and then locked into position. There is also a Fairchild aerial printer.

For print inspection at the hypo tray, there is a controlled beam light recessed in the ceiling (above the tray) which is operated by a foot switch. Handley says he first saw it in the Life lab, but the unit is produced by the Kleig Company and can be easily installed. There is a diaphragm on the lens so the projected spot can be cut down in size if desired. Beyond the hypo tray, there is a 12-in. deep utility sink with a foot operated hand spray. In the wall above the utility sink, there are pass chutes, one on either side of the sink. Through these chutes, the finished prints are passed to the receiving sink in the finishing area. Then they are placed in one of three washers—two Lenz Washers and one Pako Rocker-type Washer. After a thorough washing, the prints are placed in a solution of Pakosol or any normal wetting agent. Surplus water is squeegeed off the prints on the inclined draining board. The prints are then put on the seamless drum dryers. There are two for glossy prints and one for matte prints, with an additional matte dryer in the photostat area. All dryers have exhaust hoods to carry off hot air, as has any machine with a heating element.

When the prints come off the dryers, they are put through a print straightener, and from there go to the collating table where they are matched with the print order and

(continued on page 63)

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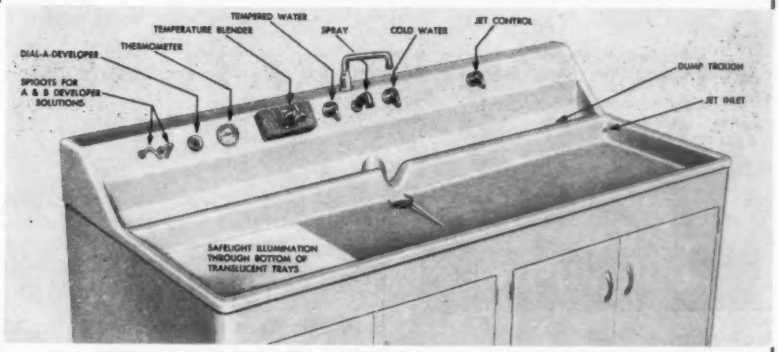

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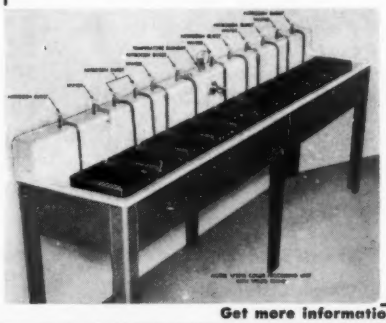

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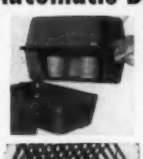

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Morris Gordon and Friend

IN-PLANT TEST

He's used about every view camera you can name, and some you can't. Here's what Gordon thinks of the Swiss Sinar.

SPECIFICATIONS: Sinar Expert View Camera. Interchangeable backs and bellows or adapters permit rapid change to 8 formats. Polaroid back available late this year. Micro-gear operated fine and coarse focusing. Unlimited rise and drop. 90° tilt, 3" left and right shifts, 30° side swings, full camera swivel around optical bench axis. Graduations with click-stop center-marks, fully visible levels. Each adjustment has positive lock; fingertip operated and interchangeable for right- or left-hand operation.

Collapsible wide-angle bellows and flat frames accommodate extreme wide-angle lenses. Wide-angle bellows, with magnifier, doubles as focusing hood. Unlimited extension of bellows and optical bench permit extreme telephoto lenses. Auxiliary frame or interchangeable backs usable for macro-photography, copying, photomontage, and trick processes. One microscopic adapter attaches Sinar to any microscope for photomicrography.

Sinar synchronized shutter usable with almost all lenses, automatically closes as holder is inserted. BC flash insert for up to 20 extensions fits into optical bench tube. Registration pins, stabilizing rods, and Multicolor film holder convert Sinar 8 x 10 into reproduction camera for color separation. Lightweight: 4 x 5, 7 lbs., 5 x 7, 9 lbs., 8 x 10, 11 lbs.

Morris Gordon, Assistant Superintendent in Charge of Photographic Services, Western Electric Co., reports: We have two Sinars and use them for all our large camera work. We've found them more satisfactory all round than any other view camera. With a complete set of backs we can shoot black-and-white in 4 x 5, color portraits and small color stuff in 5 x 7, and national color ads in 8 x 10.

The camera has a lot of good points that all add up to convenience. First of all, it's the lightest full-size view camera I've ever worked with; an 8 x 10 you can set up and use on a small-camera tripod. This is a big feature in itself, but since our men are forever flying all over the country, weight often means money to our office. Though the initial cost of a Sinar is high, as I see it we've made their price back by paying lower excess baggage charges to the airlines.

I also like the fact that all the controls on the Sinar are fingertip operated. Some of the other view cameras are so sluggish they wear you out.

The wide angle bellows is another feature that makes the Sinar a pleasure to work with; there's no vignetting or cut-off at the corners. What's more, the idea of using the wide angle bellows instead of a focusing cloth is an inspiration. It clips on very easily, right in back of the ground glass, and the magnifier fits into the spot for the lens board. A very neat arrangement. Anyone who has ever tried to handle a big camera and a square yard of dry goods outdoors on a windy day will appreciate it.

The Sinar, by the way, is ideal for using the Schneider Super Angulon. It is so compact that we get coverage of a 5 x 7 film with the 90mm Super Angulon. And you don't need one of those trick mountings that sometimes cost pretty near as much as the lens itself!

There are just a few things about the Sinar I wouldn't mind seeing changed. First of all, it's too bad the Sinar won't accept a standard lens board. Our work is so diverse that we're constantly called upon to be changing lenses. Instead of getting all our lenses remounted, we've had a camera mechanic re-tailor a Sinar lens board so that lenses mounted for other cameras will fit into it, board and all. What he did was to cut the middle out of a Sinar lens board, set a 4 x 4 aluminum frame around three sides of it, and put a Graflock on top. It works fine, and it certainly saves us a lot of time switching lenses around.

Another feature that puzzles me is the fact that the 4 x 5 back is made just too narrow to accommodate an American filmpack adapter. They must have narrower adapters in Switzerland.

People I've spoken to who use the Sinar have complained that the front board doesn't swing on the lens axis. This doesn't bother me since all it means is that it takes a few seconds longer lining up. If anyone does find it a nuisance, all he has to do is use the extension bellows, which is easy to hook up. The front board on that has all axis movements.

There's one feature of the Sinar that's seldom mentioned, but I think it's pretty important. The Sinar is beautifully made. Most of the people who come into my studio are engineers, and practically every one stops to admire it as a magnificent piece of craftsmanship.

This is not to say that the Sinar is a flashy piece of apparatus. It isn't. There's nothing on it that's just for show. It looks just like what it is: a highly-developed piece of equipment for the serious professional. That's saying a lot.

by Bernard Hoffman

QUESTION & ANSWER

QUESTION: In our medical work we are attempting to transfer some of our old 35mm slides into a movie using a 16mm camera. How can we accomplish this?

—W. L. Cooper, M.D., Lexington, Ky.

ANSWER: Probably the best way of doing this is to enlarge your 35mm slides to 4 x 5 or larger transparencies. (Most custom color laboratories can do this for you if you don't wish to do it yourself.) Then illuminate your enlarged transparencies with diffused light from the rear and shoot them directly with a focusing lens on a 16mm motion picture camera on a titler. This method not only enables you to shoot at convenient working distances, but allows you to move in close and photograph small sections of the original scene to emphasize important details.

QUESTION: Why do you speak of 35mm film and cameras if the film really is 24 x 36mm?

—Gaston G. Krishman, Chicago, Ill.

ANSWER: While the *frame* size of most 35mm cameras is about 24.5 x 36.3mm, the width is 35mm. ASA dimensions give the width of negative raw stock as 34.98mm plus or minus .03mm, leaving about 5mm on both sides of the picture area for sprocket perforations.

QUESTION: Other than making a special negative or scraping the emulsion off with a razor blade, is there any way of preparing the borders of a glossy print so that I can write data on them?

—Ernest Miller, Sherman, Texas

ANSWER: You can type on glossed photographic paper or write on it with grease pencils, crayons, drawing inks or India ink. Trouble is that these markings rub off with varying degrees of ease. Some inks, such as Higgins Eternal Ink, leave a vestige even when most of the marking is gone. The only convenient way of making permanent markings on the front of a glossed print that I know of is to write in India ink on a "thin" part of the negative (on the shiny side, of course, so it reads left to right) before printing.

QUESTION: I would like to shoot several different shots of either people or objects in action. I believe what I have in mind is called a stroboscopic effect. What is the procedure for getting eight exposures on one film? If I wanted to take a shot of a tire blowing out, showing several stages in one shot, would this take special equipment?

—Curt Giese, Milwaukee, Wis.

ANSWER: Stroboscopic effects can be obtained in three ways. The use of a single unit firing several times in rapid succession is not very practical. The very few outfits capable of this type of operation are bulky, heavy and expensive. Since they are required to charge and fire in a fraction of a second, moreover, their light output is fairly low.

Stroboscopic effects can be made with a single unit by making a series of exposures on a single film. If you plan your action carefully, and shoot in a darkened room against a black background, you can make excellent multiple exposure pictures.

If it is necessary to record the action as it occurs, you could use a separate electronic flash unit for each step you wish to record. Shooting open flash, you can set off the units in succession from a simple rotary switch (available at most electronic supply dealers, who can show you how to connect the triggering wires to the contacts of the switch). Before shooting, it's a good idea to try several dry runs, to get your timing down pat.

The shot of a tire blowing out would require an automatic setup activated either by sound or by the force of the blowout itself. But a blowout is an almost instantaneous thing and multiple electronic flash, in quick enough sequence to record the event, might show such an overlap of images as to be meaningless.

High speed cinematography is a better choice of medium for this subject.

QUESTION: Occasionally I have had a print that required reducing in a small area or spot. Figuring that ferricyanide would do the trick, I have proceeded to use that chemical with a brush or cotton tip. All too frequently, however, the worked on area has retained a brown yellow stain. Can the stain be avoided?

—Lee Drucker, Oyster Bay Cove, N. Y.

ANSWER: To prevent staining, mix your potassium ferricyanide solution with hypo (three ounces of sodium thiosulfate in a pint of water) immediately before use. You'll then be using non-staining Farmer's reducer, which is available in inexpensive packets complete with directions in most photographic stores.

QUESTION: Using a miniature enlarger and a No. 1 photoflood, I've been able to make satisfactory black-and-white negatives from 35mm color slides. Can I use the same method to make Ektacolor Type S sheet film negatives for Type C prints, without a filter?

—James F. Kemp, Danbury, Iowa

ANSWER: Filtration is the least of the problems. Harder to resolve is the difficulty of contrast. You have probably been overexposing and underdeveloping your black-and-white negatives to compensate for the high contrast of the transparency. You can't apply the same solution to Ektacolor films. Although it's possible to use a contrast control mask on your transparency or a contrast-lowering flash exposure, it's easier to take your 35mm transparency to a photo dealer for a Kodacolor negative (actually made on a special low contrast internegative film). The cost is 30 cents and you won't have to worry about contrast or the color temperature of the lamp shifting as it ages.

What's your technical problem? Ask Bernie Hoffman. It's simple, just write: Questions Editor, PMI, 33 W. 60, New York 23, N. Y.

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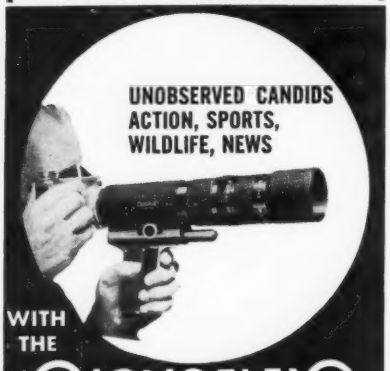

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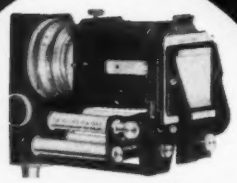

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POCKET-SIZED LAB

(continued from page 27)

all overhaul manuals are produced, require a negative size of exactly 8½" x 11". These are laid out two-up and shot on a 12" x 18" film. Outside and top are already in register, and an aluminum template laid down between the sheets of copy to ensure correct space for the separating cuts. The job could have been done using pin register and having special 8½" x 11" film cut. It is always a great feather in a technician's cap to solve a problem using the materials on hand instead of having others made. The latter is sometimes unavoidable, though. In this case it was found to be much more convenient to use a standard film size and eliminate all the worries that would inevitably flow from the extra operations involved in getting a special supply of an odd size.

Fred Schroeder, Jr., and George W. Rodgers received a suggestion award for setting up the template system and following through with the idea of trimming the negatives to size with three cuts of the power trimmer. Previously, trimming 100 negatives by hand required six hours. With uniform negatives assured by the template, almost any number can be sized exactly in just as long as it takes to operate the power cutter—a matter of a few moments. Two hundred at a clip is the largest number that has been processed so far, but there is no reason why twice or three times as many negatives as that can't be done should the job require it.

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Most important in setting up a graphic arts department, says Mr. Martin, is the calibre of the staff. The work is highly specialized, and for efficient operation should be handled only by men of considerable experience in the graphic arts field.

Technical help

Excellent technical advice and assistance in setting up a graphic arts department, says Mr. Martin, is available from the manufacturers of reproduction equipment, who also put out several publications which are invaluable to the man who must keep up with the latest processes, materials, and techniques in the fast-moving graphic arts field. THE END

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DARKROOM SINKS

(continued from page 28)

oddball or the mad genius who can turn out professional-grade work using only the three little trays and 49¢ safelight with which most of us started in photography.

At the heart of every darkroom operation is water. Anyone who has ever had a batch of irreplaceable negatives ruined by impurities in the water won't need to be told why the Indians were particularly diabolical in devising tortures for anyone caught poisoning a well.

Yet the wrong sink can do as much damage to lab efficiency as arsenic in the old oaken bucket. There's no need to risk disaster: any of the manufacturers listed in PMI's guide to darkroom sinks can—and will, gladly—help you find exactly the sink that's indicated for the kind of work you do. In fact they will design your darkroom for you. Trained engineers will diagnose your processing problems and write you an equipment prescription—all at no cost.

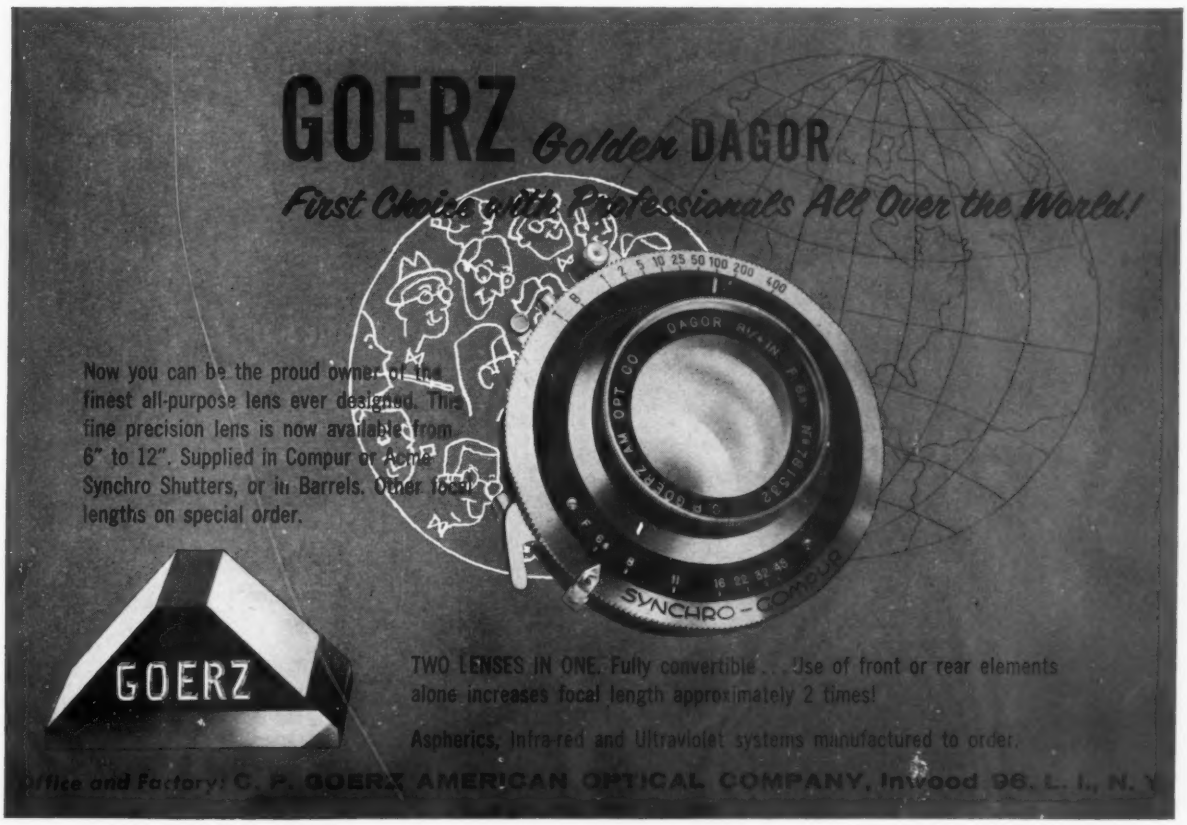
Sales gimmick? Sure it is! So what? There's more to darkroom planning than just painting over the windows. The old wooden sinks the neighborhood carpenter installed half-a-century ago were good enough for their day—and they certainly were cheap enough. If you're doing a snappy line of *carte-de-visite* portraits, or coating your own plates with collodion and all that goes with it—the antique wooden sink is all right for you. If you're doing anything the least bit more up-to-date, though, you should give some thought to your equipment. Are you getting the maximum of service from your sink? Does your sink require more man-hours in just keeping it clean and watertight than it's worth? Briefly—are you wasting too much time looking after a piece of darkroom apparatus that should be all but taken for granted? If your sink is battered, outmoded, or just plain old, you probably are. It will be worth money to you in the long run to get some expert advice from any of the firms listed in PMI's darkroom sink chart. For remember, it's a horrible feeling to know that just because your sink wasn't up to today's requirements, an important job went down the drain!

The art of fitting the right sink to the right job is such an involved one that PMI won't even attempt it in the space of one short magazine article. What we will do, though, is use all the powers of persuasion at our command to urge anyone contemplating darkroom revision to get in touch with the design staffs of the manufacturers. It costs nothing, and saves money and worry in the end. All you have to know is your problem—these men know the answers!

And don't build first and ask advice afterward. It's always less trouble—and cheaper—to know what you're going to do before you do it. With a little intelligent foresight you won't be stuck with the costly problem of getting a big piece of equipment through a small door, or the disagreeable job of knocking out a freshly-plastered wall to do the plumbing or electrical fitting that should have been done first.

Moreover, it's too much to ask of an ordinary businessman that he understand the complicated engineering problems involved in setting up a darkroom. And make no mistake, it is engineering. So leave the expert's job to the expert.

For additional information on darkroom equipment and planning, just circle 265 on the Readers Service Card, page 59. PMI will forward your name to the manufacturer.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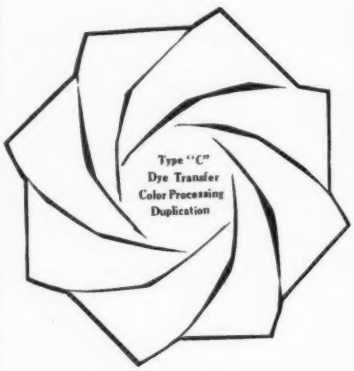

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PHOTO DEPARTMENT ANALYSIS

(continued from page 35)

is this—he puts all the film in the developer, and one minute before developing time is up he inspects one film under the green light. If it is the density he wants, he then puts it into Flashograph rapid fixing solution and in 15 seconds he can inspect under the white light. If it is good, he still has time to get all the films out before the developing time is up.

There are 3½ gal. light tight tanks for cut film and 6 gal. stainless steel deep tanks for roll film. The Aero Graphic XX film is developed in regulation aerial developing tanks and dried in an aerial drum film dryer. Films are put in Kodak Photo Flow before being placed in the Pako Drycab.

The bulk of processing is 4 x 5—Royal Pan, Super Panchro-Press Type B and Royal-X Pan. For 35mm work they use Plux-X, Tri-X and for 120 size, Verichrome Pan, Tri-X and Panatomic X (see chart).

There are seven enlargers in the projection print room—three 4 x 5 Omega D2's, one 35mm Omega, a 5 x 7 Elwood condenser enlarger and two 5 x 7 Eastman Autofocus diffusion enlargers. Each unit of three enlargers has its own developing and fixing trays, which are in stainless steel sinks.

A typical enlarging cubicle is 56-in. wide. Each unit is equipped with a foot switch which activates the enlarger and at the same time turns off the safelight to make composing and focusing on the easel easier. A second foot switch turns on the timer which is preset for the required exposure and turns off the safelights during exposure. Thus, the technician can have both hands free for dodging or vignetting. Any qualified electrician is able to work out the wiring for the switch and make the necessary modifications in the circuits—the details are too intricate to include here. Each operator has his own drawer space, under the enlarger, where he keeps his tools, such as dodging devices and other accessories.

One interesting innovation is a special enlarging bench made for the 5 x 7 condenser enlarger. In making extra large prints, an adjustable

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easel can be elevated or lowered by means of tracks which permit the easel to be adjusted to varying heights, from floor level to 36-in. The tracks are 8-in. apart. As everyone knows, an 8 x 10 condenser enlarger is very expensive, so when extra large prints must be made, this is how Mr. Handley solved the problem, without buying this equipment. When it is known in advance that such enlargements will be needed the photographers, in such cases, switch from the 9 x 9 aerial camera to 5 x 7, f/8 or K-20 (4 x 5) aerial camera. With this specially designed bench and 5 x 7 condenser enlarger, they are able to make 20 x 24 prints from part of a negative.

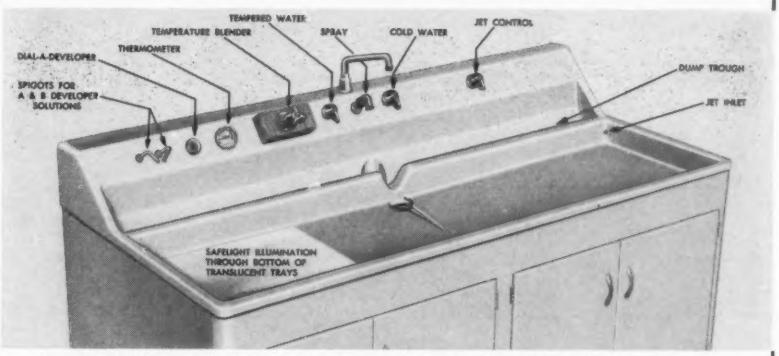
Next to the projection printing area, there is another room designed mainly for contact printing with two semi-automatic 11 x 14 contact printers. One side of this room, however, is allotted to two 8 x 10 diffusion enlargers—one Saltzman and one Elwood. The Elwood enlarger is on a table with castors so it can be easily moved about and then locked into position. There is also a Fairchild aerial printer.

For print inspection at the hypo tray, there is a controlled beam light recessed in the ceiling (above the tray) which is operated by a foot switch. Handley says he first saw it in the Life lab, but the unit is produced by the Kleig Company and can be easily installed. There is a diaphragm on the lens so the projected spot can be cut down in size if desired. Beyond the hypo tray, there is a 12-in. deep utility sink with a foot operated hand spray. In the wall above the utility sink, there are pass chutes, one on either side of the sink. Through these chutes, the finished prints are passed to the receiving sink in the finishing area. Then they are placed in one of three washers—two Lenz Washers and one Pako Rocker-type Washer. After a thorough washing, the prints are placed in a solution of Pakosol or any normal wetting agent. Surplus water is squeegeed off the prints on the inclined draining board. The prints are then put on the seamless drum dryers. There are two for glossy prints and one for matte prints, with an additional matte dryer in the photostat area. All dryers have exhaust hoods to carry off hot air, as has any machine with a heating element.

When the prints come off the dryers, they are put through a print straightener, and from there go to the collating table where they are matched with the print order and

(continued on page 63)

KREONITE FIBERGLASS SINKS



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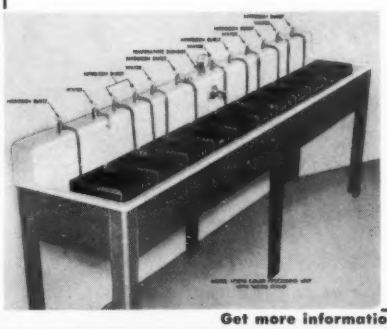

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FREE LITERATURE

AUDIO-VISUAL

Projection Screen **207**

Universal Screen Co. Sample of a new screen material designed to provide brightness and a wide viewing angle as well, is offered for a try-it-yourself screen test.

Visual Media **203**

Pilot Productions, Inc. offers a 12-page brochure. "Visual Media," on their audio-visual production services from 35mm slide making to the production of complete industrial motion pictures.

CAMERA & LENS

Nikon SP **208**

Nikon Inc. 12-page booklet describes in detail the newest camera in the Nikon line, the SP. Lists lenses, accessories and prices.

Exakta Unlimited **206**

Exakta Camera Co. 36-page booklet on Exakta and Exa cameras, including complete technical data on the cameras themselves, lenses, stereo attachments, close-up assemblies and other accessories. Prices are given.

Photomicrographic Unit **219**

Canon Camera Co., Inc. 12-page booklet describes a complete system for making photographs through professional microscopes with the Canon Camera and Photomicrographic Unit.

EQUIPMENT

Cable Releases **214**

Effen Products. Catalog sheet gives descriptions and prices of Effen "Armor-Clad" cable releases.

Plastic Comb Binders **205**

American Photocopy Equipment Co. Literature on the use of Apeco Bindak equipment and plastic binding materials for binding booklets, catalogs, photographs and reports.

Demineralizers **209**

Enley Products, Inc. 6-page folder lists ion-exchange water demineralizers for photographic use, a water purity meter and demineralizer compounds. Includes prices.

35mm Enlarger **217**

Sun Ray Photo Co., Inc. 8-page folder on the Zenith 35mm photo enlarger.

SUPPLIES

Toning Procedures **213**

Eastman Kodak Co. Chart "Toning Procedures for Kodak Papers Using Hypo Clearing Agent" gives data on each of the processing steps when using toners.

Fine Grain Developer **218**

Clayton Chemical Co. Pocket-size booklet provides conversion tables for film speeds and development times on Clayton P-60 fine grain developer.

GRAPHIC ARTS

Photocopier **204**

American Photocopy Equipment Co. 6-page folder describes a dial-operated desk photocopier, the Apeco Auto-Stat.

Photomechanical Equipment **202**

Robertson Photo-Mechanix, Inc. 40-page catalog of process cameras, lenses and accessories; graphic arts printers and contact frames; stripping tables and etching machines.

Process Cameras **201**

Lacey-Luci Products Co. 10-page folder describes Lacey-Luci graphic arts equipment including an offset-duplicating platemaker, a line of graphic arts cameras and visualizers, which optically scale art and photographs and can be used for making enlarged or reduced photocopies.

LIGHTING

Electronic Flash **215**

Amglo Corp. 8-page booklet lists portable Amglo professional electronic flash units, accessories and prices.

MOTION PICTURES

Film Processor **216**

Fairchild Camera and Instrument Corp. 4-page folder on the Mini-Rapid 16, which processes 16mm motion picture film in daylight in as short a time as 20 minutes.

Tripod Dolly **211**

National Cine Equipment Inc. Catalog sheet on collapsible three wheel dolly for professional motion picture tripods.

Music Library **212**

Filmsounds, Inc. 4-page folder describes the services of this New York sound library and complete sound editorial service organization.

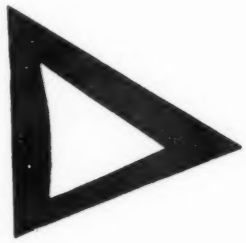
High Speed Processor **220**

S.O.S. Cinema Supply Corp. Catalog sheet gives data on the Bridgamatic 16mm Ultra High Speed Reversal Film Processor.

SERVICES

Custom Color Services **210**

Kurshan & Lang Color Services, Inc. 16-page price list gives prices for still and cine color processing, prints, duplicates, filmstrips.



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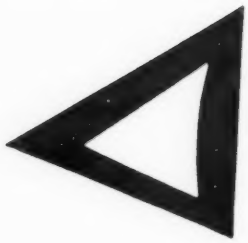

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NEW PRODUCTS

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Hico-Lite has Two Outlets 104

The Hico-Lite electronic flash Model 496 has a daylight Kodachrome guide number of 70 and, installed in a molded Fiberglas case, weighs 9 lbs., with batteries. Six 1½-volt rechargeable nickel cadmium cells

supply the power, and they can be interchanged with either photoflash or D-cell batteries. The unit also works on AC with a built-in power cord also used to recharge the nickel cadmium batteries. Dual outlets on the power supply make it possible to use two lamp heads at once and a rotary-type switch has selections for ¼, ½, ¾ or full power for either or both outlets. Recycling time is 8 sec. on full power with fully charged batteries and 4 sec. on AC. A voltmeter shows the amount of battery charge. The Hico-Lite is fully waterproof and is fitted with a cast aluminum mounting base for a standard tripod mounting screw. Other features are: ready light indicator, switch for open flash, a coiled cord extending 6-ft. and standard shutter cord connector for all standard cords. Power supply and lamp head may be used interchangeably with other Hico-Lite lamp heads and power supplies. Price of Hico-Lite Model 496 is $279.50, without batteries but with nylon strap and cup adapter.

3¼ x 4 Slide Projector 103

The Genarco slide projector, Model M2 for 3¼ x 4 slides has a 3000-watt tungsten lamp and a changer holding 70 slides. The lamp is said to have a life expectancy of 100 hours. Changing slides takes less than half a second. An electric blower supplies 280 cubic feet of air per minute for cooling. The projector may be had with either a standard wide-angle lens for rear projection or with other lenses suitable for large room or theater operation.

Jomaco Print Straightener 101

The Jomaco Print Straightener, Model PS-14, is a motor driven unit that will handle single or double weight, glossy or matte prints up to 14-in. wide. The motor operates on 110 AC. The prints travel automatically on a conveyor apron over a bronze screen, through a water vapor jet and between adjustable rollers. The adjustment of the rollers determines the degree of curl control. The unit weighs 65 lbs. and measures 21½ x 24½ x 17-in.

Sharpshooter camera 107

Inexpensive Sharpshooter graphic arts camera includes as standard equipment 10¾ in. Wollensak Raptar

which enlarges twice and reduces three times; monorail track of heavy wall steel; cut film holder with focusing back for use as a gallery camera. Also included is an automatic 5-minute reset timer, four 300-watt reflector-flood exposing lamps; 18 x 22¼" pressure-type copyboard.

Blimp for Arri 106

A new blimp for the Arriflex 35 movie camera permits use of the camera for sound filming with a 1000-ft. Mitchell magazine. Before attaching the magazine a special adapter must be placed on the camera, but no modification is required to the magazine itself and no tools are required. The adapter carries the sprocket magazine mouth of the regular Arriflex 35 magazine on its lower side, while its upper parts fit to the Mitchell magazine, secured by a knurled screw and spring latch. The two parts are connected by a flexible bellows and while the Mitchell magazine is mounted on the camera in the same manner as the Arri magazine, its weight does not rest on the camera, but on rubber buffers extending from the blimp's interior walls. The regular DC handgrip motor on the camera is replaced by the standard Arri synchronous motor drive. Through-the-lens focusing and viewing continues with the blimp or an auxilliary finder may be attached to the door of the blimp. The large rectangular port in front of the blimp makes it possible to use wide-angle lenses such as the Taylor Hobson Cooke 18mm or the Schneider Cinegon 20mm. A buckle switch is automatically installed in the Arri 35 when the camera is purchased with the blimp. The blimp alone is $3995.

Tri-Purpose Backlight 109

New Ascor Backlight, made in three models to operate with Ascorlight Series 300, 400 and 500, for backlighting, hairlighting and fill-in problems.

Snoot attachment provides contrast control of small areas. Barn

door attachment makes the new light a small fill-in or background light.

Glossy Print Dryer 102

The American Glossy Dryer, Model SGE, has a capacity of 500 to 600 8 x 10 single weight or 300 8 x 10 double weight prints per hour. Its seamless stainless steel polished cylinder is 30-in. wide and its apron is 28-in. wide. All rollers are mounted on ball bearings and the drive unit is an enclosed combination motor and geared speed reduction unit. The soft gum rubber squeegee is driven by the motor drive unit. Overall dimensions of the dryer are: 30 x 34 x 36-in. without stand. On its stand measurements are: 47 x 58 x

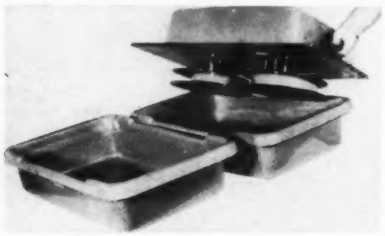
(continued next page)

(continued from last page)

36-in. The machine operates on 115-volt or 230-volt AC. A gas heated unit operates on 115 volt AC. The machine has a speed control switch for adjustments from ½ to 4 feet per minute. The thermostatic heat control adjusts from 150 to 550° and has a neon indicator lamp.

Micro Record Film Processor 105

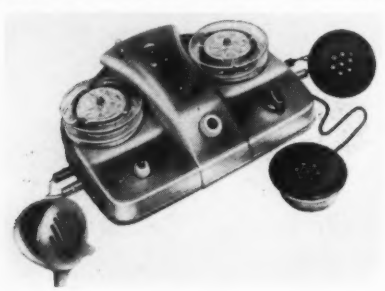
The Micro Record movie film developing unit can process up to 400-ft. of 8, 16 or 35mm film and consists of a driving mechanism, light trap, four nested tanks, 3-ft. of rubber hose with a faucet adapter and one pair



of reels. Each end of the film to be processed is stapled to Mylar leaders attached to each reel—with a strip of plastic tape to cover the staple to prevent damage. The driving mechanism pulls the film back and forth through the solution. When the unwinding reel reaches the point where live film and leader are joined, rotation of both wheels automatically reverses. Mechanism and film are transferred from tank to tank in proper sequence in daylight, with a light trap protecting the film from exposure during processing. The Micro Record processor requires only 3½ gal. of solution and has a shipping weight of 59 lbs. Tanks, hood over mechanism, light trap and reels are of plastic and guaranteed unbreakable. Reel-carrying spindles are of stainless steel and mounted in lifetime grease-sealed stainless steel precision bearings. Price of the Micro Record processor is $390.

Low Priced Recorder 110

Operating on only four pen-lite batteries, Tel Tape, a transistor tape recorder made in West Germany,



weighs less than two lbs. Basic price for recorder is $29.95, including earphones and microphone. Available accessories include a Patchcord at $2.00 for playback through radio, TV or phonograph speaker, and a light Stetho Head Set at $6.95.

Plastic Filmstrip Cans 112

Available in four colors, with white paper disc in lid for easy labelling, new FilmKare filmstrip cans weigh only ⅓ oz.—half the weight of a metal can. Designed to fit all regulation filmstrip storage and shipping containers, cans are packed 1000 to the carton, bodies and lids separate.

Miniature Flashbulb 113

The first truly professional flashbulb in the M2 bulb size was announced recently by GE.

Called the PowerMite M5, the new zirconium-filled bulb has the same picture-taking effectiveness as the larger G-E No. 5 flashbulb, and can be used with the same cameras. It is the same size and shape as present M2 miniature lamps.

The M5 is actually a miniature No. 5, and shares its ability to synch at all shutter speeds, its effective light output, and its complete color correction for color photography.

PowerMite M5 and M5B, a blue lamp corrected for daylight color film, will be available at 14¢ and 17¢ respectively.

For additional information on any new products item, circle the appropriate number on the readers service card attached to page 59

Polaroid Album 115

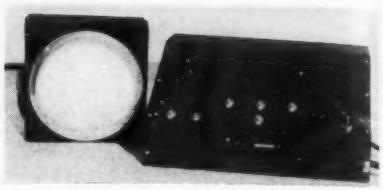
Callen "Magazine Model" album accommodates not only both Polaroid print sizes (2¾ x 3½ and 3½ x 3½) but also small jumbo prints (3½ x 3½), large jumbo prints (3½ x 5) and the popular 2 x and 3 x color print sizes.

A refill system permits the intermingling of all print sizes. As many as 500 prints can be accommodated in one album.

Pictures slip into individual acetate jackets, which Polaroid Corp recommends as best protection for their prints.

Type C Light Source 111

Aristo Spectro-Con is a cold cathode enlarging light source designed to eliminate the need for filters with Type C color print materials. Lamp housing contains three lamps, red, green and blue. Power pack is separate cabinet to which lamp housing



is connected. This unit houses power supply, switches and three color-control dials, each controlling a single lamp.

Polyethylene Tanks 114

A new line of standard polyethylene tanks has just been announced by American Agile Corp.

Line is composed of three basic types. Cylindrical, self-supporting tanks, with 55 gal. capacity. Square self-supporting tanks, with 25-gal. capacity, rectangular self-supporting tanks, also 25-gal.

These tanks can be supplied with mixing and stirring equipment, outlets, covers, sight glasses, overflows, and similar fittings.

Junior Trombone 108

Mole-Richardson Co., Hollywood, has come out with Type 1731 Junior Trombone for set lighting. Adjustable set wall arm allows for hanging over wall thicknesses of from two to 12 in. A junior lamp

may be hung either top or bottom in the socket provided at the end of the swinging arm.

Two extensions allow for placing the lamp from 21 to 61 in. from set wall, and a soft rubber ball prevents damage to the wall. Unit weighs 11 lbs. END

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PHOTO DEPARTMENT ANALYSIS

(continued from page 57)

negative and then checked for quality. Then they leave the lab area—going first to the caption clerk who captions the print and sends it on to the department requesting it. The negative and proof are given to the subject classifier who uses a perforated stamp on the proof print, classifies it, and then negative and proof are filed.

At one end of the finishing area, Rogers Thorpe has his desk. The most important items on it are the daily control sheets which show what jobs have been assigned to the men and when they are due.

All photographs are taken upon specific request of a staff member who requires the photography to fill a specific management need in connection with research, planning or day-to-day administration. After completion of the work, the cost for all photographic services is calculated on the requisition form and charged back to the requisitioner each month.

Each of the eight darkroom men handles all jobs that go through the lab—contact and projection printing, copying and photostat work. The lab technicians are also responsible for projection of motion pictures and slides. They must be able to handle expertly many kinds of projectors—from the intricate 16mm sound movie projector to the 35mm filmstrip and lantern slide machines. The men are rotated from one job to another, never staying more than a week in one area of the lab.

All men in the laboratory are encouraged to become cameramen if their interests lie in that direction. These men volunteer for extra assignments as part of their in-service training. After a certain amount of experience they may take part in a competitive promotion examination conducted by the personnel department. The examination consists of written, performance and oral tests. The written test covers chemistry, camera technique, optics and a knowledge of materials used in photography. The performance test is a basic requisition assignment, which requires the candidate to make a picture story from the information supplied on the requisition slip. He must also make an architectural shot, a portrait, a still life setup and a press-type picture as well as a color exposure. The oral test covers personal qualifications. Successful candidates are then placed on an eligible list and promoted as vacancies occur.

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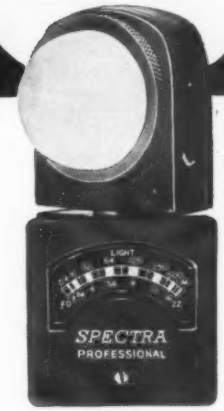

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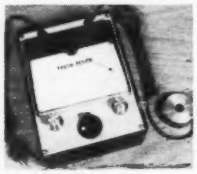

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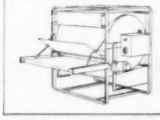

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EXPLOSION PROOF

(continued from page 44)

These tests are extensive, vigorous and expensive. Normal photographic electrical equipment for still and motion picture work would all be restricted by the National Electrical Code for use in hazardous locations. Before any of this equipment can be used in Class 1 locations, it must be explosion-proofed. For Class 2 or 3 locations, it must be combustion-proofed or dustproofed.

So far, no commercially produced photographic electrical equipment has gained the Underwriters seal of approval as explosion-proof. Flammable conditions vary greatly and each piece of equipment has to be tested for each specific existing condition which prevails in the location in which it will be used.

Definition

The National Electrical Code defines explosion-proof (for a Class 1 location) as "enclosed in a case which is capable of withstanding an explosion of a specified gas or vapor which may occur within it, and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes or explosion of the gas or vapor within, and it must operate at such an external temperature that a surrounding flammable atmosphere will not be ignited thereby." In other words, it is a casing that will let the gas explode harmlessly inside without damaging or injuring anything or anyone outside.

For Class 2 locations, the requirements are not so difficult. The equipment need only be dustproof or dust-tight and operate at a temperature that is low enough not to ignite the surroundings.

One of the most active organizations concerned with the developing of explosion-proof equipment for photography is the Electrical-Mechanical Research Division of the Bureau of Mines in Pittsburgh, Pa. Mr. R. S. James, Chief, Branch of Electrical-Mechanical Testing, is responsible for the development of an explosion-proof flashbulb reflector and a 1000-watt explosion-proof color corrected flood lamp for movie and still photography. Although the light was designed specifically for use in gaseous mines with methane gas and coal dust hazards, Mr. James believes it can be used safely in other hazardous industries for Class 1, Group D locations and perhaps some C locations. However, he stresses the fact that it is not designed for use in all haz-

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ardous locations. It should be tested in the specific explosive vapors which it will encounter in use. The flash unit consists of a 7½-in. reflector and skirt in an explosion-proof aluminum housing. The batteries for setting off the bulb are enclosed in this explosion-proof housing. The electric energy of the tripper cord is below that which is capable of producing an incendiary spark. The flashbulb can be safely inserted in an explosive atmosphere. It also works as an extension light with a slave unit. The whole unit weighs 12 lbs.

Floodlight

The 25-lb. explosion-proof floodlight looks like a regular movie spotlight. It is air cooled, using a fan to circulate the air inside. The housing is an aluminum shell with fins to speed cooling and keep all external surfaces below 400° F. The 3200 Kelvin light is produced by a sealed 1000-watt bulb designed by General Electric Co. engineers. Anyone interested in the light and construction details should write to the Electrical-Mechanical testing division, U. S. Bureau of Mines, 4800 Forbes St., Pittsburgh, Pa.

The operating room in a hospital is a dangerous location. Here, the use of anesthetics such as cyclopropane, ethers, ethylene may form a flammable or explosive mixture, making the anesthetizing room in a hospital an explosion-hazardous location. All electrical equipment and wiring has to conform to rigid specifications of the Electrical Code.

Heavy gases

There is one important factor that makes photography possible using electrical equipment. All gases used in anesthesia are heavier than air. When any gases escape or are spilled by accident, they rest on the floor. With permission of the surgeon in charge or the anesthetist, flash lamps or floodlights can be used in an operating room as long as they are above the 5-ft. danger level and all the flexible cords, switches and connectors have been explosion-proofed or are above or outside the 5-ft. explosive area. The lights must not be of too high a temperature. This is not only because of the dangers from explosion, but for the surgeon who cannot operate at too high a temperature because tissues dry out or become damaged.

The light must also be shatterproof. Naturally there is no problem when a spring wind movie camera is used in surgery, but an electric

(continued on page 66)

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EXPLOSION PROOF

(continued from page 65)

driven camera, with electrical connections, must be used above the 5-ft. level or be explosion-proofed. Eastman Kodak used to make a spark-proof motor for the Cine Special camera which they have discontinued. The Arriflex has a spark-proof motor that should be safe to use in the operating room.

The Wilmot-Castle Co., surgical equipment manufacturers, makes an overhead operating light with a built-in 35mm camera which takes color transparencies during operations. Jerry Johnson of Photo Lectronic Research has developed an electronic flash that is safe to use in an operating room. The unit is rated at 150 watt-seconds and is enclosed in an aluminum case which also contains the batteries. The whole outfit weighs only 3½ lbs. and can be clamped to the operating lamp. It has an ingenious pneumatic trigger device that trips the camera and lamp without outside electric wiring. The camera can be used below the 5-ft. level.

Casings made for underwater photography can also be used sometimes. Equipment in water tight casings is certainly dustproof and with some modification can be made explosion-proof. You can put some air pressure in the housing or fill it with some inert gas like CO_2 under pressure. As long as the pressure is in the box or casing, there can be no explosion. Naturally, this filling of the case should be done only under strict safety supervision.

Here is a homemade gadget that may be helpful. Keep your electronic equipment in an inflated transparent plastic bag. Then you can be sure that as long as the bag is inflated no explosive mixtures will be near your photographic equipment. The flexibility of the bag makes it possible for you to use some of the controls of your equipment inside.

A parting word: a picture may be worth a thousand words, but it isn't worth any human life. So don't do anything risky in an explosive atmosphere. You can't correct mistakes when you're dead. THE END

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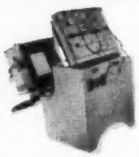

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LETTERS

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PMI is truly the first interesting informative trade magazine in this field. Good luck!

Harold E. Caughy
Whippany, N. J.

To the Editor:

. . . It has already answered two questions of location of source of supply, and a technical query that has been bothering us for weeks.

R. Maxwell
Detroit, Mich.

To the Editor:

Received my first copy of PMI and am very pleased. Enjoyed all the articles, especially those on color and electronic flash.

Leo G. Brown
Des Moines, Iowa

To the Editor:

. . . I do hope a reasonable amount of space will be devoted to the problems of my fellows who are not on the direct payroll of industrial activities, but who, like myself, are independent operators, and work on assignments from advertising agencies and advertising departments of industrial firms. Also I hope you will have a department devoted to handy devices created by photographers. I happen to be a gadgeteer who likes to make such handy and useful things to make things easier and smoother, and I also enjoy seeing what others create.

Hank Tenny,
Dallas, Tex.

To the Editor:

After reading your first issue I have to compliment your organization on the fine job you are doing for the industrial cinematographer. I had thought you would forget this important man, but your editorial proves you have not.

Thomas J. Valentino
New York, N. Y.

To the Editor:

I just finished reading Volume 1 Number 1 of "Photo Methods for Industry." A great idea! Every day photography is coming more and more into industrial and engineering life.

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Dr. J. Kosar
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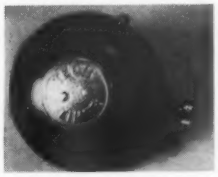

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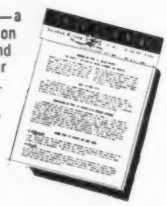

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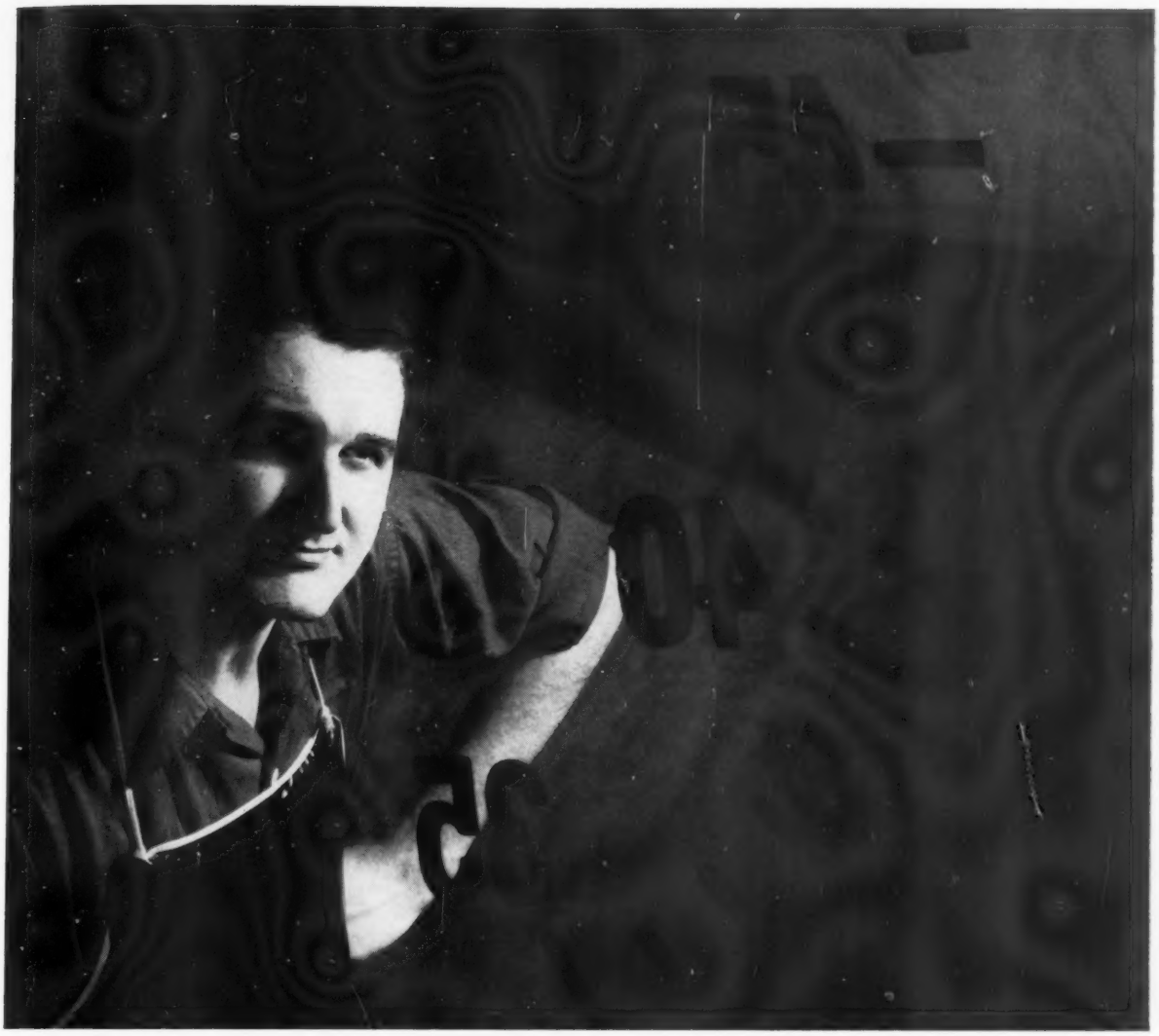

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